

RAILROAD GAZETTE

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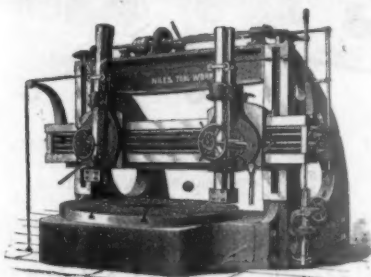
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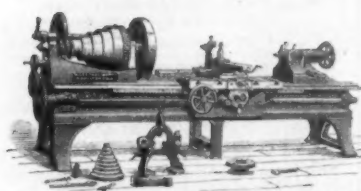
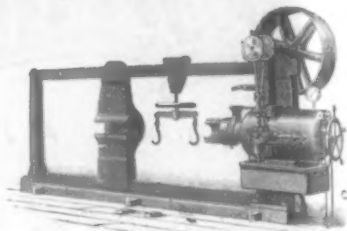
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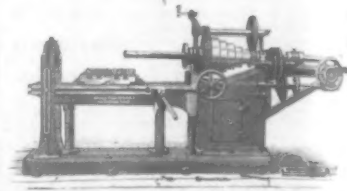
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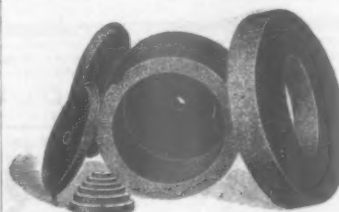
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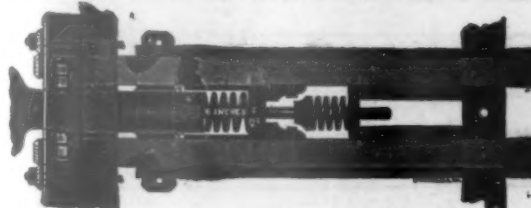
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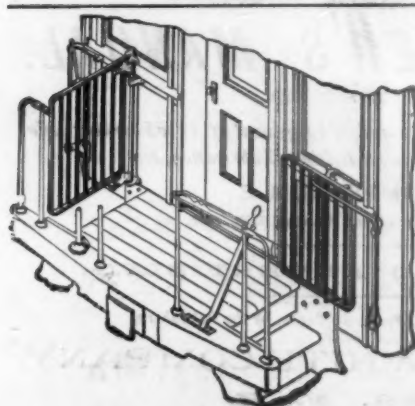
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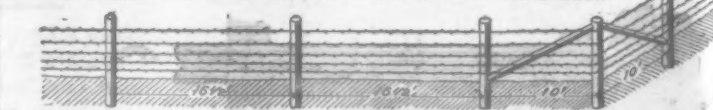
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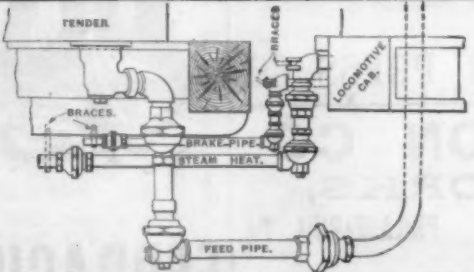
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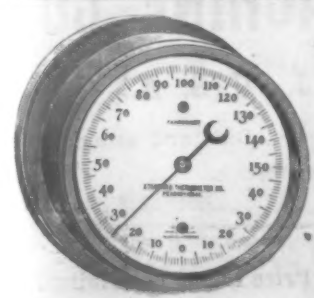
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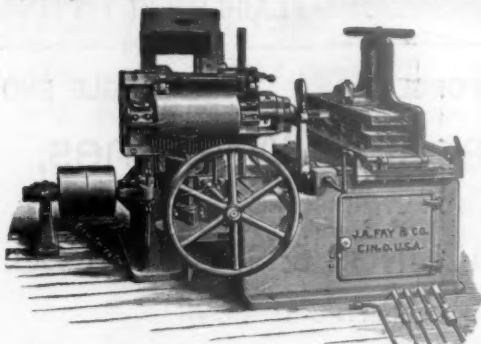
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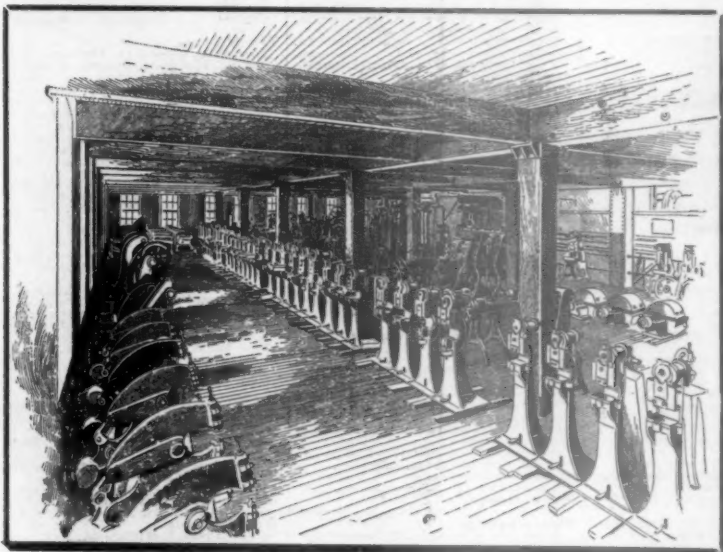
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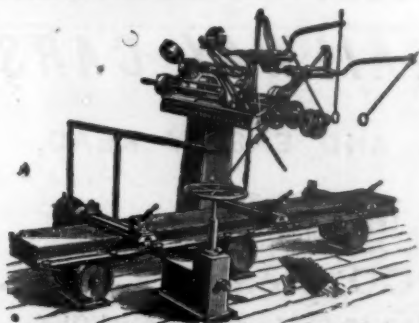
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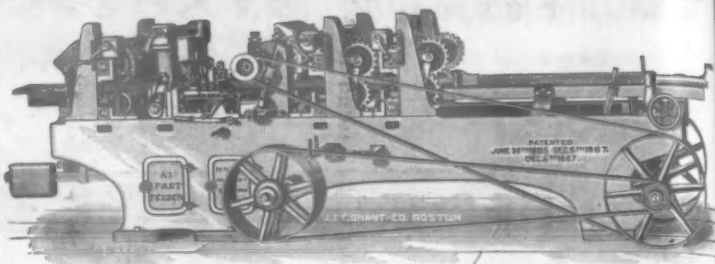


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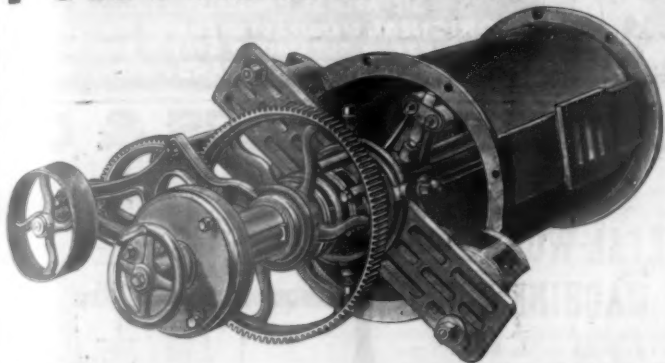
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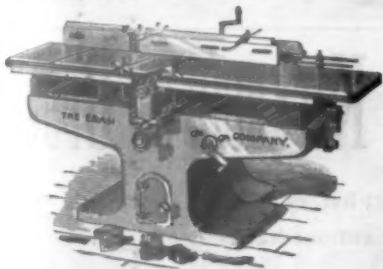
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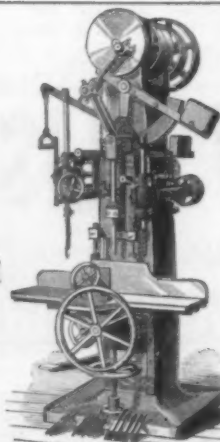
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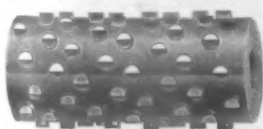
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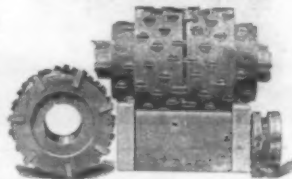
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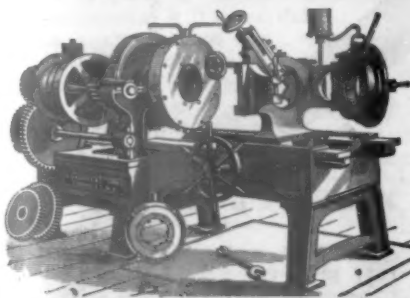
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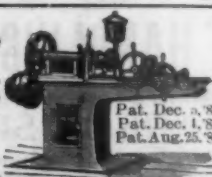
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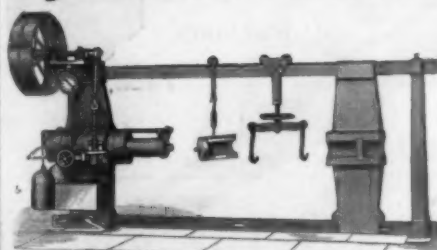
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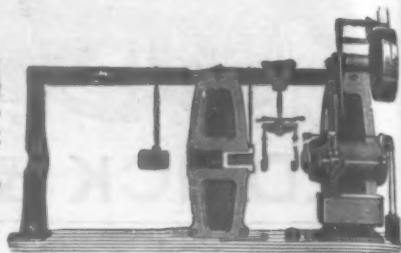
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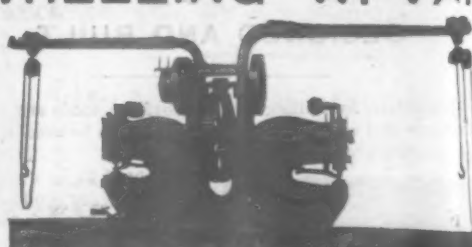
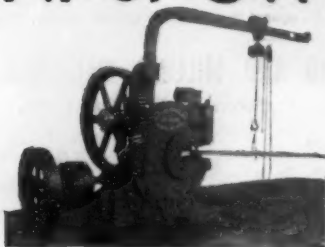
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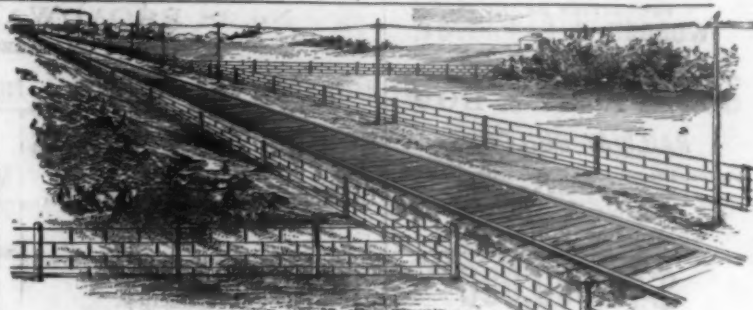


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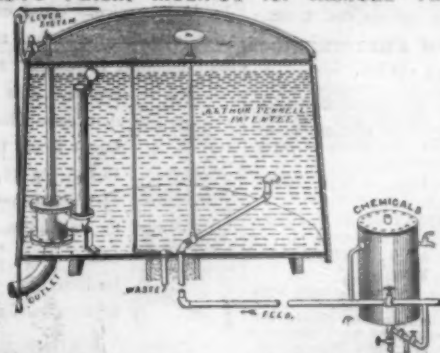


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New York, Oct. 30, 1892.

The annual meeting of the stockholders of *The Railroad Gazette* for the election of three directors and for the transaction of such other business as may come before the meeting, will be held at No. 73 Broadway, New York, Nov. 3, 1892, at 3 o'clock.

DANIEL D. WAUGH, Asst. Secy.

NOTICE OF ANNUAL MEETING.

The annual meeting of the stockholders of the L. E. WATERMAN COMPANY for the election of directors for the ensuing year and for the transaction of such other business as may properly come before the meeting, will be held at the office of the company, No. 157 Broadway, in the city of New York on the tenth day of November, 1892, at three o'clock in the afternoon. Transfer books will close on the fifth day of November and will open on the fifteenth day of November, 1892.

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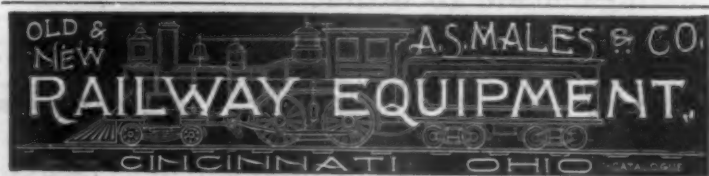
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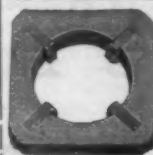
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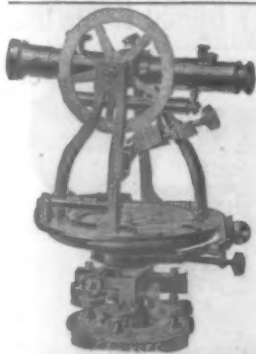
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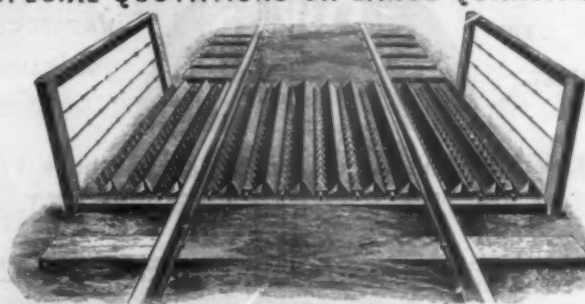
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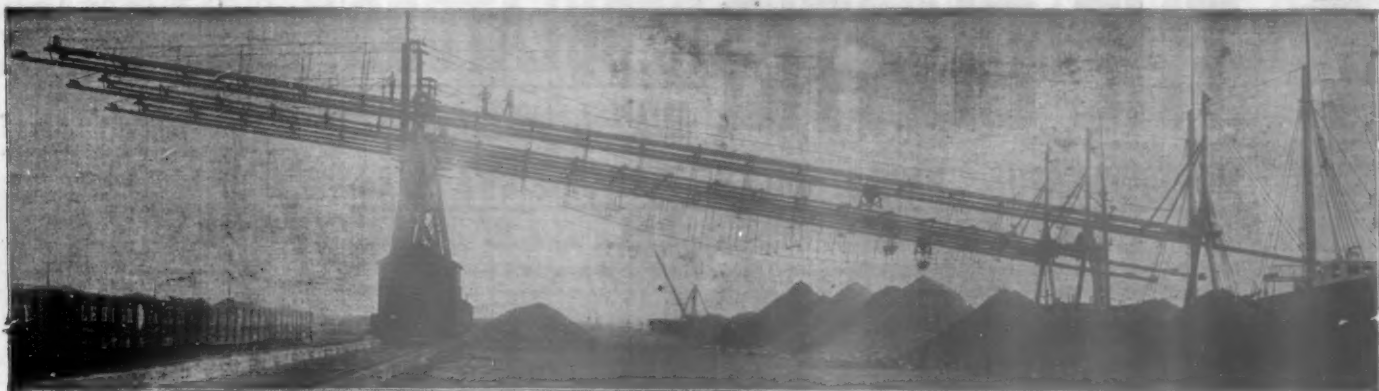
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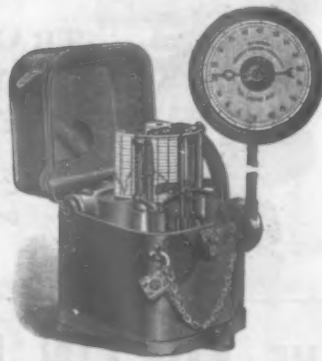
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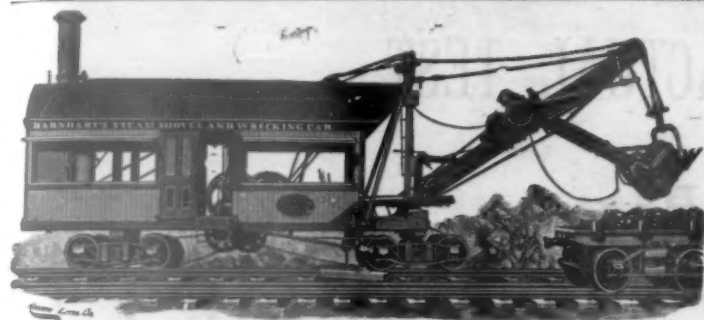
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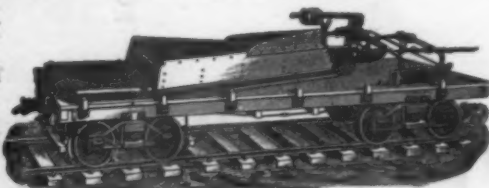
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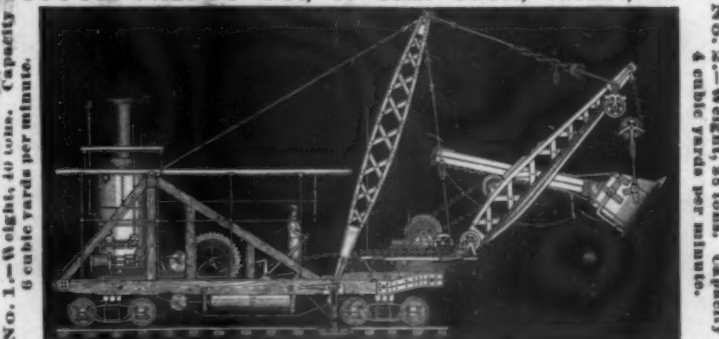
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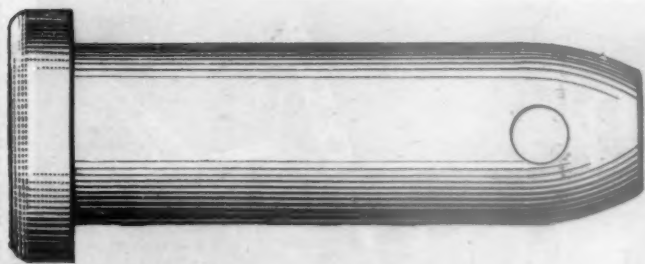
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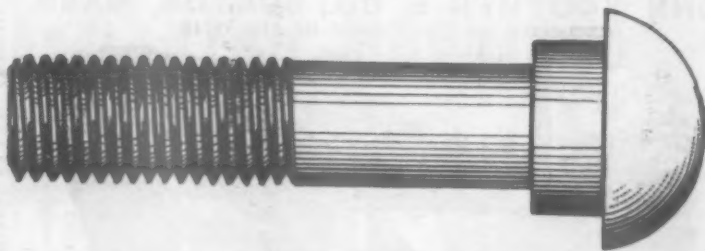
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GEO. S. MORRILL,
Chief Engineer.

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E. K. TURNER,
Chief Engineer.

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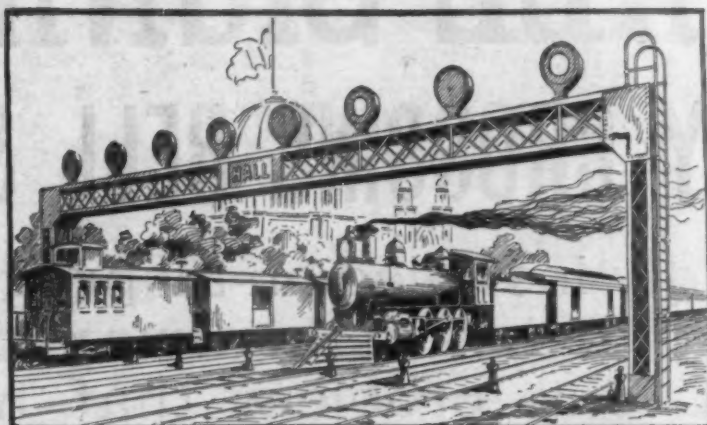
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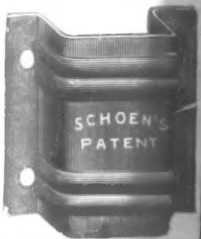
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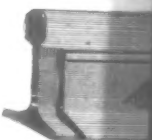
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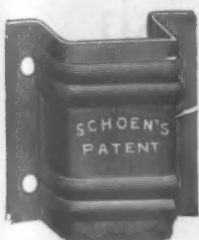
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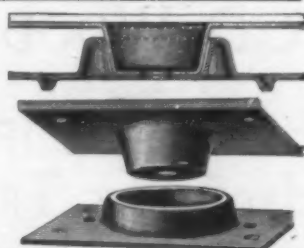
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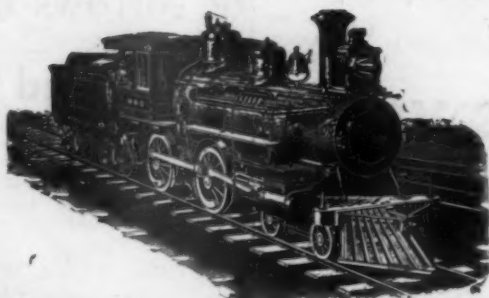
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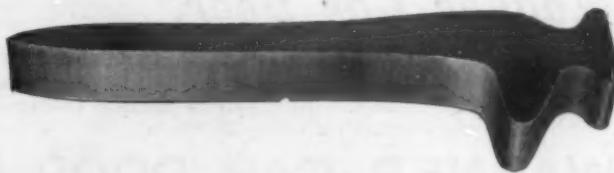
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FRIDAY, NOV. 4.

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Contributions.

The Proposed Penalty for Diverting Freight Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

You have well said in your editorial note of October 14 that the rules adopted by the American Railway Association for preventing misuse of cars will be hard to enforce.

An examination of the details of the scheme gives strong ground for the belief that a great many railroads will hold back from the actual adoption of the scheme when the time for putting it in force arrives. Even if a working number of railroads were to adopt the scheme it would be more fruitful of misunderstandings and contentious correspondence in its practical working out than it would of penalties collected.

The resolutions passed appeared to be based upon the rules proposed at the meeting of railroad officers called by Mr. Simpson, Superintendent of Transportation of the Chicago, Milwaukee & St. Paul, and held at Chicago last February. These rules laid down with some clearness a broad distinction between the "use in local service of foreign cars" and "diversion of freight cars." Under these rules a car was not "diverted" when used in local service, even when it was so used out of its route. The diversion occurred when the car was delivered to a foreign railroad out of route.

The rules provided a penalty for each of these offenses. The use of foreign cars in local service out of route was covered by a demurrage of 50 cents a day, to be exacted after a car had been on a foreign railroad for 30 days, while the diversion of a car, that is, its delivery to a foreign railroad out of route, was to be followed by the payment of \$1 to the owner of the car.

This distinction between the use of foreign cars in local service and their delivery to a foreign railroad out of route is a useful one, and if generally recognized would clear up a good deal of the misunderstanding now prevalent in regard to the diversion of foreign cars. Exacting a penalty for both of these species of diversions would be good if it were practicable, more especially the penalty for local misuse, as it is probable that the owners of cars suffer much more from their local use on foreign railroads than they do from their actual delivery to other foreign railroads out of route. Whether a high demurrage, to be exacted after a given length of time, would be more efficient than a low per diem rate, to be charged for every day's use, is an open question; but this question is not of much consequence just now, because the American Railway Association cut out of its rules all mention of a penalty for the local use of foreign cars.

It is not easy to understand why, after cutting out this penalty, the Association preserved the prohibition of this local use of foreign cars. The rules for this prohibition are retained exactly as proposed at the February meeting referred to.

The adoption of any new set of rules or laws is invariably accompanied by misunderstandings among the parties affected, and for this reason the meeting of February very wisely provided that if any dispute arose a referee should be appointed to enforce the rules. Unfortunately no measure for the appointing of this referee is now provided, and this seems the more strange because the example of the Master Car Builders' Association, with its efficient Committee on Arbitration, is patent to all railroad men.

That such misunderstandings and disputes will be likely to arise where this code of rules is adopted would seem evident by an examination of the rules themselves. In the very first rule, after prohibiting the use of foreign cars in local service, it is expressly stated: "It shall, however, be permissible to send them in an opposite direction to secure a home load." How far in an opposite direction? On general principles it would seem legitimate for a long railroad to send the car perhaps a hundred miles in order to secure a home load, while with railroads immediately connecting, a movement of only a few miles out of route would often seem illegitimate. But as there is no penalty provided against this local use of foreign cars, each will do as he pleases.

The elaborate set of rules intended to cover the reassignment of shipments when such reassignments will cause a diversion, and calling for the transfer of the loads of such cars at the expense of the railroad authorizing the reassignment, is entirely vitiated by the provision that in case shipments are of such a character that they cannot be transferred, cars may be run to destination. Every one will interpret this to suit himself, and this provision will be sure to lead to extended and excited correspondence.

A provision that cars loaded with transferrable commodities may be loaded to a junction point common to the roads that respectively own and move the car, is liable to misconstruction, and, unless carefully explained, will probably lead to the use of cars in through trade over rival railroads. Jersey City is a junction point common to the Pennsylvania and the Erie, and it would hardly seem a stretch of these rules to use them to authorize the loading of an Erie car from some far western point to Jersey City, via the Pennsylvania, or vice versa.

The one point that is well covered is that when one railroad delivers to another empty cars for a return load these cars must be loaded back regardless of ownership; but even this may be misunderstood unless it is clearly and rigidly interpreted. It is quite possible to conceive a railroad in the centre of the country objecting to such use of its cars between local lines in New England at a point where it might be hard to determine which of the two local railroads was actually diverting the car; and the same may be true of cars interchanged at any of the larger railroad centres. Finally, this set of rules is defective in that it makes no mention of the so-called Belt lines, and does not attempt to define their responsibility. Much of the friction in the per diem experiment of 1888 was caused by the attitude of railroads of this description, and if an attempt is made to adopt these rules we may expect a renewal of such trouble. C. D. N.

Ships and Shipbuilding on the Great Lakes.

I.

Those who have been directly connected with lake shipping, or have been so placed that they have had occasion to observe the extent of the transportation business on the great lakes, as for example at Detroit or Port Huron or Sault Ste. Marie, have, of course, an idea of its magnitude, but it is difficult to realize the extent of the shipping interests of the lakes except by personal observation. It is well known that the number and size of the boats used on the lakes have been constantly and rapidly increasing for many years, and also that the character of the construction has been to a great extent changed. By far the greater number of new ships which have been built recently for lake use are made of steel, and in some cases very closely resemble sea-going steam vessels in general appearance and size. The latest additions to the lake fleet are no less than 330 ft. long, and are intended for the fast passenger service. The greater number of the steamers on the lakes are, however, intended for freight transportation, and the development in lake ship construction has naturally been almost entirely in the direction of obtaining increased cargo capacity without the increase of draft.

The result of this has been the development of a class of steam vessels which have some features quite different from ocean going steamers. The demand being for large cargo-carrying capacity, combined with shallow draft, the question of speed is of minor importance, although by no means insignificant. Lake steamers are, therefore, as a rule, shallow for their length and width, as compared with sea-going ships, and it is customary to place the boilers and engines as far back in the stern of the vessel as it is possible to get them. Further than this, in the effort to gain increased carrying capacity without sacrificing structural strength, the ordinary type of ship construction, having more or less sheer, appears to be giving place to straight-back steamers, which are built without any sheer whatever. These have been followed to some extent by what is called the "monitor" class, and this again by the "whalebacks." The last have been so generally described as to make a detailed description uncalled for. It will be remembered that these ships have no flat deck or bulwarks, but that the sides are arched inward from a little above the load water line and the frames and plating are extended across the ship, forming a rounded deck. The midship section of such a ship is simply a flattened oval. In these ships space is provided for the engine room, and for the windlass, etc., by building up turrets near the ends of the ship. The pilot house is placed on top of

the forward turret. The result is that the ship when loaded has somewhat the appearance of the old double-turreted monitors, but on account of the blunt bow and arched deck they can hardly be said to make as good an appearance. The advantages of the whaleback form of construction appear to be greater strength for a given weight of material; less dead weight, and therefore greater carrying capacity for a given displacement; reduced resistance to wind and sea on account of the curved deck and reduced free board, and lower cost of construction.

The so-called monitor class of ships on the lakes is a compromise between the common form of ships and the whaleback. The sides are arched inward, or tumble home rather more than has ever been customary in marine practice, but not enough to class the ships properly as whalebacks.

All of these steel freight steamers are built with double bottoms, forming a water bottom, ordinarily about 4½ ft. deep which is connected with pumps of large capacity and is used for water ballast. Other notable features of the cargo steamers are the very flat floors and the small number of transverse bulkheads as compared with ocean steamers.

The greater part of the new tonnage built upon the lakes during recent years consists of steel steamers and the proportion of such vessels as well as their carrying capacity is yearly becoming larger although the new tonnage in the form of wooden vessels is by no means insignificant. During the year ending June 30, 1892, 64 vessels aggregating 83,223 net registered tons and costing \$7,911,000 were added to the lake fleet. As illustrating the characteristics of these new ships the following particulars are given concerning the steamer "E. C. Pope," which has a well deserved reputation as a cargo carrier. This steel steamer was built by the Detroit Dry Dock Co., in 1891 and is 334 ft. 6 in. long over all, 316 ft. keel, 42 ft. beam, 24 ft. molded depth. The double bottom has a capacity of 950 tons of water ballast. The engines are triple expansion and have cylinders, 22, 33 and 56 in. in diameter by 44 in. stroke. There are two Scotch boilers 14 ft. 2 in. in diameter and 11 ft. 6 in. long; working pressure, 160 lbs.; indicated horse-power, 1,400; sectional screw, 13 ft. 2 in. diameter, 16½ ft. pitch. This steamer has carried 125,000 bushels of corn, weighing 3,527 tons from Chicago on a draft of 15 ft. 9 in. and 125,000 bushels of wheat from Duluth. Ships larger than the "E. C. Pope" have since been built of which the general dimensions have been given in the *Railroad Gazette* from time to time, and some of which will be referred to later.

Much attention has been given of recent years to the magnitude of the lake commerce and it is not our intention to present many statistics in this connection, but as the subject cannot be properly appreciated without some reference to statistics we extract the following particulars from a report made by Mr. Geo. H. Ely, of Cleveland, before the International Congress on Inland Navigation at Paris last summer. The registered American tonnage of the lakes June 30, 1891, was 1,154,870 tons, consisting of 1,592 steam vessels representing 736,751 tons and 2,008 sailing vessels. The tonnage has more than doubled during the last five years, the increase being almost exclusively in steel steamships of from 1,500 to 2,500 registered tons. The ship building plants at Cleveland alone launched 71,323 registered tons in the year 1890-1891. As already mentioned the lake tonnage has increased during the year ending June 30, 1892, by the addition of 83,222 tons. Of the total United States tonnage launched in 1890, 46 per cent. was on the great lakes. The value of the American shipping now afloat on the lakes is over \$60,000,000.

In regard to the extent and importance of lake transportation, the estimated annual freight movement on the lakes is at present over 63,000,000 tons. The movement through the Detroit River alone in 1890 was estimated by the United States census at 36,233,563 tons. The total foreign trade at all the sea ports in the United States for the same year amounted to 23,933,313 tons. Consequently the tonnage movement through the Detroit river for 1890 may be placed at about 10,000,000 tons above the total entries and clearances in the foreign trade at all the sea ports of the United States, and, from the same statistics, at 3,000,000 above the combined foreign and coastwise tonnage of the ports of London and Liverpool. The ton-mileage of the lake traffic in 1891 was more than 25 per cent. of the total ton-mileage of all the railroads of the United States. Of the total tonnage moving through the Sault canal 90 per cent. is made up of the five commodities, wheat, corn, iron ore, coal and lumber. These primary products, having a value of over one hundred million dollars, were carried to market in 1891 on the average draft of water at the Sault lock of 14 ft. 8 in., an average distance of 800 miles, at a cost of 1.3 mills per ton-mile. The iron ore carried through the canal is stated by Gen. Poe to be over 50 per cent. of the total freight. This is another illustration of the magnitude of the business of the lakes, as in 1890 there was consumed in the United States 17,500,000 tons of iron ore. Approximately 16,250,000 tons of this was home production, and of this the Lake Superior region furnished over 9,000,000 tons, or over 55 per cent. As Mr. Ely adds, this Lake Superior iron ore could never have gone on wheels to meet the coal of the central States.

In another article we shall briefly describe the ship-building plants on the lakes.

Changes in Equipment on the Great Western Railway of England for Change of Gauge.

The cuts with this show two things of interest, the construction of an English passenger car and bogie truck and the changes necessary on the Great Western Railway in the equipment when the gauge was recently changed.

Fig. 1 shows the side elevation of one of the more modern cars having bogie trucks at each end. The general run of English passenger cars have a single pair of axles at each end fixed in the frames. This car, with a 38 wheel base, is longer than the average. It has a luggage department in the centre. Thus, baggage and passengers of first, second, and third class, are carried in the same car. Queerly enough, the third class passengers are given the middle of the car, which in this country is considered the most desirable location, while the first and second class passengers are given the ends, which are here believed to be the most dangerous and uncomfortable positions. The projections above the roof of the car are the tops of the lamps, one of which is provided for each compartment, and burns with a more or less uncertain light, and in this way compares favorably with some of our local roads which still use the old style of kerosene lamp. It is safe to say that one will scarcely find

cars are carried are in the truck and are very long, and of the plate type. These are shown over the axle boxes. On the ends of the car frame will be seen the spring buffers, which are almost universally used in Europe. The connection between cars is made by a turnbuckle, which hooks over a hook, as shown in fig. 3. This coupling can scarcely be called "automatic," yet is a very secure one.

Fig. 4 shows the buffers and the coupling hook more in detail, and also shows the spring back of the front bumpers to which the draft gear is attached. The long plate spring is, in fact, the draft spring of the car. The shaded parts of figs. 4 and 5 show what had to be removed when the gauge was changed from short to narrow. The truck frames are of iron and put together

truck frames; and while they allow some lateral motion to the car and some swiveling motion to the truck, yet they do not do so with the same freedom which our trucks do here, and we would scarcely call this a swiveling swing motion truck, as the point of resistance to motion is so far from the centre of the truck as to cause too much resistance, and we should expect on our sharp curves too great flange wear. The chain shown in fig. 5 is a safety chain. The screw coupling, before referred to, which forms the connection between cars, is partly shown.

Figs. 7, 8 and 9 show the present standard truck of the Great Western Railway for passenger cars and suitable for the standard gauge. Such a truck rides well vertically, and is durable and comparatively simple. It weighs less than our four-wheel trucks, but on crooked

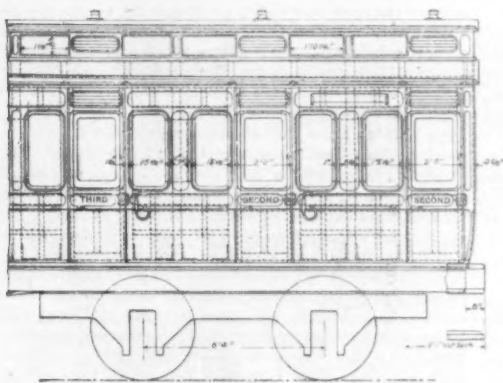


Fig. 1—Side Elevation.

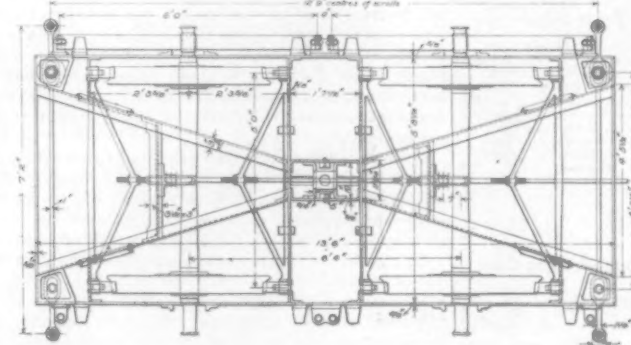


Fig. 8.
Present Standard Truck.

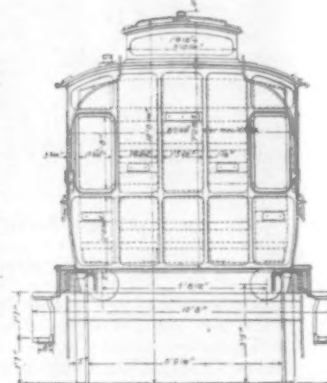


Fig. 2—End Elevation.

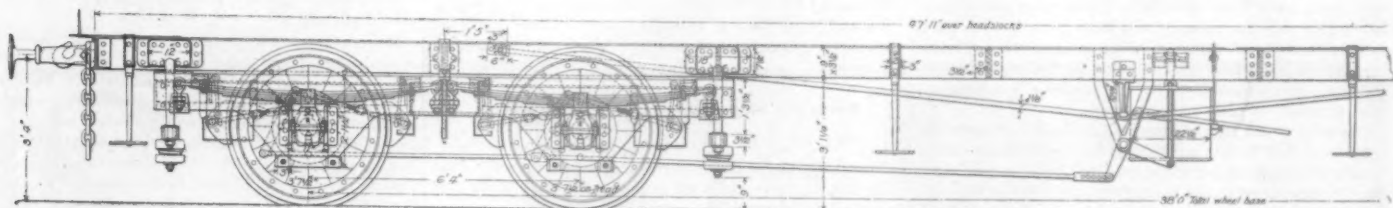


Fig. 3—Truck and Underframe Showing Brake Gear.

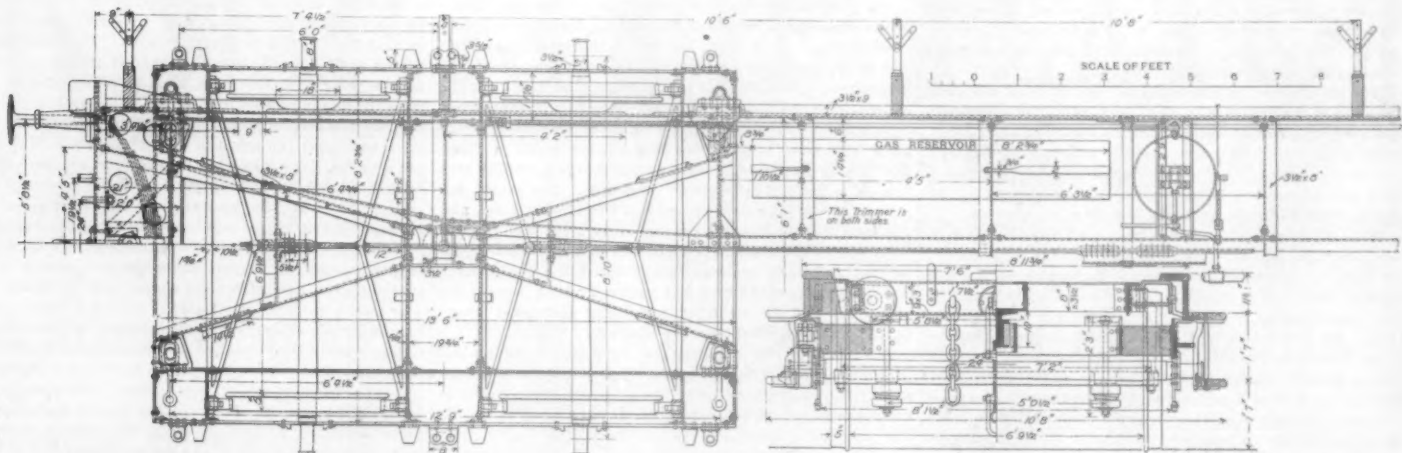


Fig. 4—Plan Showing Draft Gear and Framing.

Fig. 5—Section through Truck and Framing.

PASSENGER CAR—GREAT WESTERN RAILWAY OF ENGLAND—CHANGED TO STANDARD GAUGE.

a foreign passenger car that is lighted sufficiently to read with comfort in the evening, except, perhaps some few trains built after American plans. Even the Pintsch gas system used in Europe is not equal to our best kerosene lamps here as the gas is used so sparingly. Evidently the Pintsch system is used in Europe mainly to reduce expense and as a matter of convenience; certainly not to increase the light, as it does here.

Fig. 2 shows the end elevation. There are three side steps shown for these cars, but one of them—the top one—was removed when the cars were changed for a narrower gauge. This is indicated by the shaded parts. These steps extend the length of the car.

Fig. 3 gives a side view of the truck and underframing, showing how the automatic vacuum brake is applied, and the trussing at the side of the car. The wheels shown are made of teak centres, with steel tires. The brake shoes are of cast iron. The springs on which the

with rivets, the type of frame being that commonly built by the Leeds Forge Co., of England, in pressed steel. The difference is that the trucks here shown have a greater number of parts, many of which are reduced into one pressed steel part on the Fox system of construction. The bracing in the underframe to resist buffing is shown in fig. 4. It consists of a channel extending diagonally from the buffers at the corners to the centre plate in the centre over the truck.

Fig. 5 shows how the car framing is attached to the truck. There is a centre pin in the centre which fits into a recess provided in the transom of the truck. The load of the car is carried down vertically by struts from the side framing to the ends of a cross equalizer, shown under the ends of truck in figs. 3 and 5. It is then carried up by a vertical bolt with a spring under the nuts to the truck frame corners, all of which are shown in figs. 3 and 5. These transoms are at the ends of the

roads it could not give the same degree of comfort to passengers as our more expensive and heavier swing bolster trucks. Neither should we expect to get as good wear from steel tired wheels, owing to the increased wear of the flanges, which would surely result if the point of support was at the end of the truck frames, as it is in this case. Those who are interested in car and truck designs will find much novelty in these drawings, unless they are already familiar with the construction of English rolling stock.

Shop Notes.

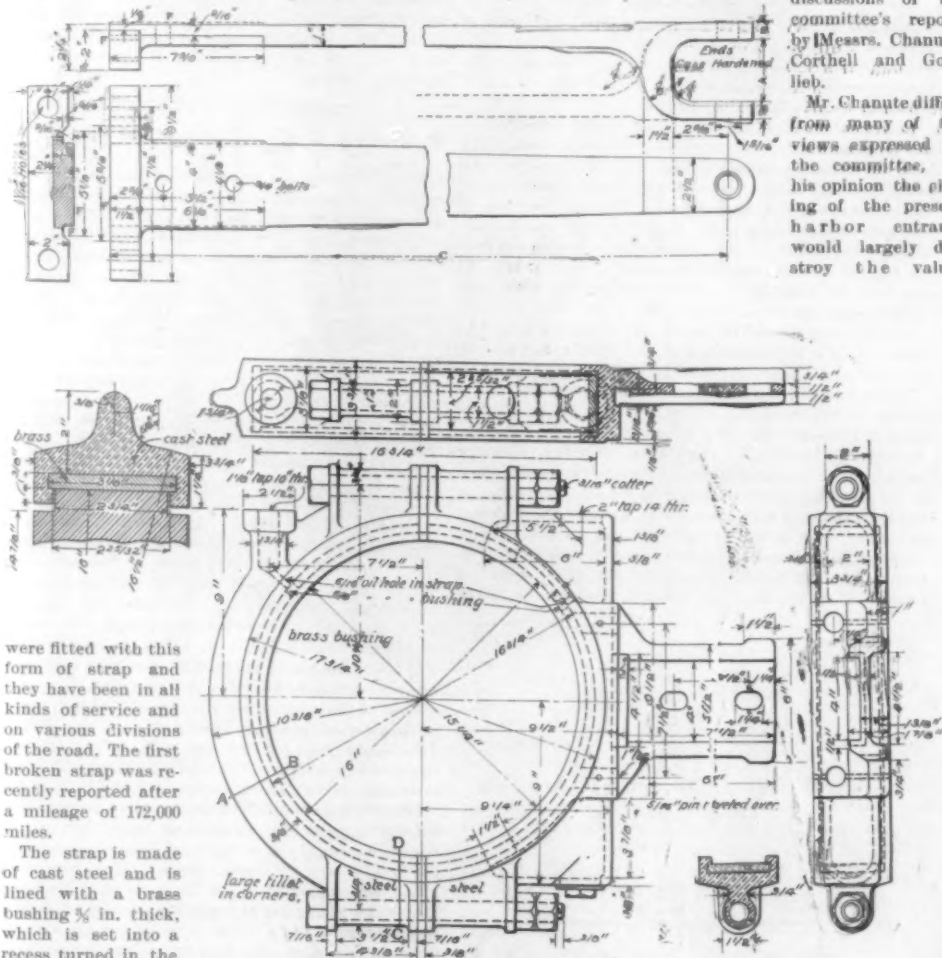
The Congdon Brake Shoe Co. is doing a brisk business in iron and steel castings at its foundry on the crossing, of Fifty-seventh street and the Chicago & Eastern Illinois R. R., Chicago. The steel foundry is a new building and is newly equipped throughout with modern facilities for making open hearth and crucible steel castings. The

building for the steel foundry, which was built by the Lane Bridge & Iron Works, is well ventilated, is excellently lighted by roof lights and is altogether an excellent example of modern foundry construction. The crucible and open hearth furnaces and ovens were built by Mr. J. A. Herwick, of Philadelphia. The capacity of the steel department of these works in all of its branches is at least 25 tons of steel castings per day. The iron foundry is turning out more than this amount of iron castings daily. A notable feature in the steel foundry is a new design of Shaw electric jib crane of 30,000 lbs. capacity.

Power is transmitted through the various shops by shafting and belt for short distances, by hemp rope transmission for longer distances, and by electricity to the large crane and to the parts of works most distant from the engines. Material is distributed through the works by the C. W. Hunt system of surface tramways in connection with numerous hand-power jib cranes, a light traveling crane near the crucible furnace, the large crane already mentioned, and an electric driven elevator.

A Steel Eccentric Strap and Combination Rod.

An eccentric strap, which is illustrated in the accompanying engraving, was introduced experimentally on the Baltimore & Ohio by Mr. Geo. B. Hagiehurst, Superintendent of Motive Power, about three years ago, and has given very satisfactory results. About 20 engines



A Steel Eccentric Strap and Combination Rod.

were fitted with this form of strap and they have been in all kinds of service and on various divisions of the road. The first broken strap was recently reported after a mileage of 172,000 miles.

The strap is made of cast steel and is lined with a brass bushing $\frac{3}{8}$ in. thick, which is set into a recess turned in the strap, as shown in the sectional views.

On account of the superior strength of steel castings these straps can, of course, be made considerably lighter than cast iron straps. A further possible advantage is gained from the fact that the coefficients of expansion of cast steel and brass are considerably larger than that of cast iron, and therefore in case of heating the steel strap expands more than the cast iron sheave, giving additional freedom. The difference in the expansion of a 16-in. sheave and strap, with the range of temperature which is likely to occur in practice is, however, not sufficient to make this a very important feature, although the effects of any elevation of temperature are undoubtedly in the right direction.

In connection with this strap a form of eccentric rod having a combination foot has been used, which we also illustrate. It will be seen that this rod is formed with a T end, and is bolted to the strap as usual with rods of this form, but that it is also bolted transversely to the strap with two through bolts. The holes in the projection of the strap for the latter bolts are oval, thus providing for adjusting the length of the rod, liners being used at the end of the rod, while the four bolts make a very rigid connection.

Durham House Drainage.

The drainage of the United States Capitol is now being renewed with brass and steel pipe, on the Durham system. This system was recommended by Col. George E. Waring, Jr.

The Railroads and Harbor of Chicago.

Further important discussion of the great railroad and harbor problems of Chicago has just been published. The reader who is interested in these matters will doubtless remember that in our issues of July 8 and 15 there appeared abstracts and discussions of the report on these subjects made by a committee of the Western Society of Engineers last May.

The committee recommended for the solution of the railroad difficulty, so far as it recommended anything, putting the railroads below the street level in open cuttings. The very great objections which appeared at once to this solution made it seem to us an entirely inadequate one. Mr. Corthell made a minority report proposing that the roads be joined into three groups of elevated roads which should enter warehouses and yards above the street grade, to and from the different levels of which cars should be handled by hydraulic lifts, and that hydraulic capstans, turn-tables, traversers and cranes should be used in the yards and on the docks.

For the harbor improvement the committee recommended that new entrances should be made to the north and south branches of the river, and the entrance through the main river be abandoned by lake craft and all vessels that cannot pass under the bridges. The latest published contribution to the literature of this subject appears in the September issue of the *Journal of the Association of Engineering Societies*, in the shape of discussions of the committee's report, by Messrs. Chanute, Corthell and Gottlieb.

Mr. Chanute differs from many of the views expressed by the committee, in his opinion the closing of the present harbor entrance would largely destroy the values

a device steep grades could be used and the approaches could be made 540 ft. long instead of 1,350. He doubts whether drawbridges can be entirely abolished because of the tastes and conveniences of foot passengers. He thinks that it is possible that a satisfactory solution could be worked out with high bridges and steam elevators; at any rate, such possibilities should be carefully considered before abandoning the present harbor entrances or making a new outer harbor.

Mr. Chanute is opposed also to the idea of depressing railroad tracks below the street grades. The cuttings would be difficult to drain anywhere, and impracticable where the roads are near the river. But the proposition to elevate the tracks and concentrate them into three groups seems to him also to involve enormous difficulties and probable great injury to the commerce of the city. Business has grown up along the existing tracks and around the existing railroad centres, so that the removal of the whole or even a majority of the present railroads from the surface of the ground is likely to deal a severe blow to the prosperity of the city by increasing the cost of transacting its business. Raising and lowering goods some 20 ft. would involve a great expense in building and in operation, but, what is of more importance, it would cut off from easy rail connection establishments now served by switches, and compel them to haul freight to the elevators, which would so increase the cost of carrying on business as to drive many establishments out of the city.

If it is proposed to elevate the main running tracks only, and to transfer freight cars to existing tracks by lifts, it would be seen that the subsequent distribution of cars along the ground, either by capstans or switch engines, will prove as great an obstruction to street traffic as now exists, and for various establishments, some distance away from the main yards, the cars handled are so few that lifts would be too costly. He believes, in fact, that handling cars by capstans, as is done in England and France, is more expensive than by switch engines.

Mr. Chanute is of the opinion that there is no one patent medicine that can possibly cure all the ills of the railroad situation in Chicago. Many of the roads which now come in along the river should remain there, on the ground, and the streets should cross overhead. Away from the river or lake front some tracks should be raised, some depressed, and some remain at the street level, according to the local conditions. In fact the problem is working itself out now on the basis of adaptation to local circumstances, but it is desirable to have some general scheme to work to, by which better facilities should be provided for the railroads, for the merchants, for the manufacturers, and for the street traffic in general. Such a plan, however, can only result from an agreement between the railroads and the city.

Mr. Corthell elaborates in his discussion some of the points treated in his minority report. He would not advise that all tracks be lifted to the level of the elevated entrances, but that cars be dropped to surface tracks by hydraulic machinery and handled by capstans so far as it is economical to use them, and by switch engines for longer distances. At the Whitecross station of the Midland road a loaded car is lifted and hauled by capstans to the terminals of the station on the level of the street, and one is lowered to the level of the Metropolitan District tracks and put on the Midland tracks, every minute, on an average.

As he does not agree with the majority of the committee in its treatment of the railroad problem, so he does not agree with its evident encouragement of the scheme of enlarging the waterway to the seaboard by building a ship canal from Buffalo to the Hudson River. He is of the opinion that the only possible route by which deep draft vessels may be carried to the seaboard is down the St. Lawrence River, and he asks the members of the Society to examine his paper on "An Enlarged Waterway Between the Great Lakes and the Atlantic Seaboard," which was read in April, 1891. All of the routes that have been suggested are there discussed and estimated on.

Returning to the railroad question; the majority report dismisses the difficulties of open cuttings with little consideration. The statement that in most parts of the city, these cuttings would be through clay nearly impervious to water does not agree with the views expressed by experts in a recent discussion on Chicago foundations. In fact, the character of the material underlying the city varies so much in different places that any opinion is hazardous. Such cuttings would have to go through filled material, through sand, through hard clay and through soft clay, changing in consistency. Between Englewood and Twelfth street, over 50 streets would have to cross the line of a depressed road which have sewers in them varying in diameter from one to seven feet and the grades of the sewer lines are from eight to 12 feet below the street grade. Most of these streets have water pipes also from five to 10 feet below grade, and gas mains at lesser depths. The bottom of the railroad cut would be eight or 10 feet below the water level of the lake, and all seepage and sewer water would have to be pumped out by steam or other power for there is not sufficient head to work siphons. The cost of constructing a four-track sub-way through the varied material, of providing arrangements for disposing of the drainage, of changing the sewers and other pipes and of building street bridges, would ex-

of property in the present business centre and transfer elsewhere the location and pressure of traffic. The avowed object of closing the river entrance is to do away with the bridge difficulty, but to Mr. Chanute it seems as if it were incumbent upon engineers to consider whether or not this difficulty cannot be diminished. He says that the committee dismissed the idea of tunnels very summarily in consequence of the length of the required approaches, which it is assumed would reach a quarter of a mile back from the river. He suggests that if the street traffic is to be brought close to the water's edge it might be done in two ways; by using a circular inclined plane, or by lifts to get into and out of the tunnels. The pressure on the bridges is due more to the great wagon traffic than to foot passengers. He doubts whether the circular inclined approach would be the most satisfactory solution for team traffic, but thinks that perhaps lifts or street railroads could be applied to the passage of teams; in fact, elevators might be used to pass the traffic over high bridges. He thinks, however, that considering the loss of time and cost, better results could be got by the use of street railroads. For instance, tracks could be laid through the tunnels on which wagon traffic could be carried on trains of low flat cars, hauled by cable or electric power, and by such railroads 1,200 to 1,800 teams could be passed an hour, which is about the present traffic of an ordinary bridge. By such

ceed the cost of an elevated railroad for a like number of tracks.

Mr. Gottlieb agrees with Mr. Corthell that a system of elevated roads would be preferable to depressed subways, and says further that such elevated roads would be needed only in certain districts, while in other districts the roads could be elevated for part of the clearance and the streets depressed. He would recommend, however, five lines of entrance instead of three, as recommended by Mr. Corthell. Like Mr. Chanute he considers that this is only a partial solution, and he would leave the freight traffic on the level, for the present at least, because there are so many interests which could not be properly served by an elevated system. He is not so sanguine about the future of hydraulic apparatus in American railroad work as Mr. Corthell is.

The Gaston Electric Headlight.

We print herewith illustrations showing an electric lamp for use in headlights, designed by Mr. James E. Gaston, of Sparta, Ill. We also show a sketch of the dynamo used on some locomotives of the Mobile & Ohio

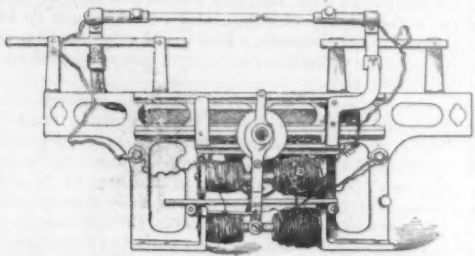


Fig. 1—Gaston Electric Lamp for Locomotive Headlight

railroad to furnish the light for this lamp. The above named road has had five of these headlights in use for some time, and some of them have been in constant use for a year and a half. The principal peculiarity of this lamp is the arrangement of the carbons in a horizontal instead of a vertical line. The extreme length of the machine, shown in Fig. 1, is 26 in., so that it will go into a standard locomotive headlight case. Its extreme height is 12½ in., and width 4 in. The manufacturer claims that the feeding apparatus, giving, as it does, a forced feed, will hold the carbons in perfect

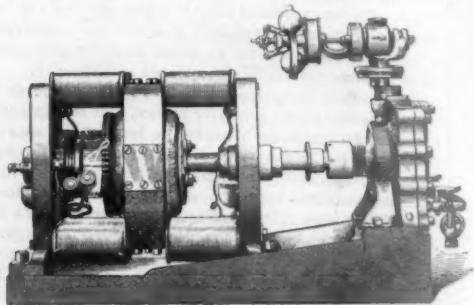


Fig. 2—Dynamo for Gaston Electric Headlight.

alignment at all times. The jar of the engine will not affect the carbon points or allow them to pass each other. With vertical feeding lamps the separating mechanism will, it is claimed, sometimes fail to make the separation, which then has to be done by the attendant. Gravity feeding lamps have to be accurately fitted, and even then by the time the carbon is pretty well burned out there is vibration enough in the rod to materially affect the light by the jar of the engine. A little dust or oil will sometimes make the carbons stick, and a downward thrust of the engine at a low joint is liable to jar the carbons together.

This lamp is fixed low on its base, the extreme height being only 12½ in. The Mobile & Ohio Railroad has the engines and dynamos located on the fireman's side, with the dynamo inside the cab and the engine just outside, which makes an arrangement much liked by the master mechanics and engineers. The apparatus can, however, be located on the same platform as the lamp, as it requires a space only 30 in. long, 10 in. wide and 18 in. high.

The New Rail of the State Railroads of France.

When the State Railroad system of France was established, the symmetrical, double headed rail was adopted as standard on the Orleans lines. This was about 50 years ago, when it was impossible to foresee the use of steel. The substitution of steel for iron has done away with the principal reason for symmetry in the section, which necessitates a faulty distribution of metal, and improvements in rolling permit the rail to be made higher and more slender, and hence stiffer with given weight. The new rail section adopted is therefore similar to the English "bull head" section. This section is described, and the reasons for its design are stated by M. Bricka, Chief Engineer of Road and Buildings of the State Railroads, in a recent issue of the *Revue Générale*

des Chemins de Fer, and what follows is much condensed from his paper.

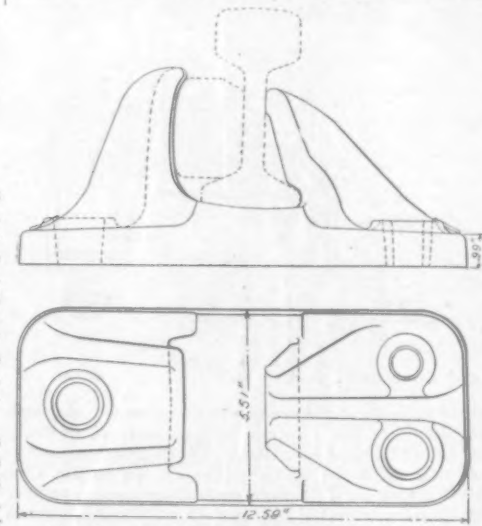
Considering the tendency to greater weights and speeds he thinks that it would be a grave error to give up the chair for use with wooden ties. This gives a solidity of attachment which it is very difficult to get with the Vignole, or flange rail. It secures an invariable inclination of the rail relative to the tie, and, further, it permits of the employment of soft wood ties, which the State roads can buy at a very low price. With metal ties, the flange rail could be safely used, but the first cost would then become so great that it is very doubtful if any economy would be realized over the use of the "bull head" rail, with chairs and wooden ties.

It appears to be demonstrated that steel rails are worn out, for the greater part, from causes independent of the normal wear of the running surface. On the State railroad system a wear of 13 millimetres (½ in.), which is the limit fixed for the rails now used, seems to correspond to a life of more than 100 years, and engineers need not trouble themselves to secure a greater wear, which

would not be profitable either from the point of view of progress, or from that of the best use of capital invested. For railroads of much heavier traffic, provision has been made in recent rails for a wear of 26 millimetres (1 in.), which may there be justified.

But the stiffness of the rail ought to be increased as far as practicable, and, at present prices of steel, lightness of section should not be especially sought for. The small economy in the first cost will be more than lost by the increased cost of maintenance. The aim therefore in the new section has been, to give it such dimensions, that after a thickness of 13 millimetres has been worn off the top, its stiffness will still be equal to that of the old standard rail when new. With this new section, and with a reduction of the distance between ties (if that becomes necessary later) the track will be good enough to carry traffic at any speed and at any weight that may be anticipated for years to come.

There seemed to be no reason for giving the two heads of the rail the same size, except, perhaps, the re-employment of the old chairs; but it seemed wise to renew the chairs with the rails, for the reason that their bearing surfaces will be considerably deformed by wear, when it becomes necessary to renew the rails. Moreover, it has been thought very desirable to increase the width of the lower head, in order to give greater area of contact between the rail and chair, and also to give greater stiffness to the rail in the transverse direction. This last consideration Mr. Bricka thinks very important, as the



New Standards of the State Railroads of France.

lateral deformation of rails is one of the most frequent causes of derailment. The extreme width of the lower head, therefore, has been made seven centimetres (2¾ in.), as shown in the cut. The thickness of the web has been reduced to 16 millimetres (0.63 in.) in order to get the metal further from the neutral axis. The height of the rail is 145 millimetres (5.71 in.), and the distance between the two heads greater than any heretofore used in France or England. The flanging angle is 28 deg. 15 min., which is the general angle employed in France. The weight of the new rail is 80.6 lbs. a yard, an increase of 5 per cent. over the present standard, while the stiffness of the rail has been increased 14 per cent.

The form adopted for the angle plates is shown in the engravings. These weigh 41.8 lbs. a pair, which is almost double the weight of the present standard which has been found entirely inadequate.

The increasing weight of locomotives has made it necessary to increase the base of the chair. With the present chair the wood is crushed and the frequent ad-

ing to adjust the chair to the tie increases the cost of track work and diminishes the life of the tie. Moreover, it seemed very important to increase the bearing of the rail in the direction of the length in order to diminish the wear of the rail in the chair and also to shorten the span between bearing points. The new chair has a base of 69.44 sq. in., which is 17.36 sq. in. more area than the present standard. The rail seat in the chair has been designed so as to hold the rail in its normal position if the key is displaced. In such a case the rail head cannot be displaced more than two or three millimetres (.078 or .117 in.).

In order that the weight of the chair may be uniformly distributed, it has been considered necessary to use three screws, and, further, the well known English device of using a wooden ferrule in the bolt holes has been adopted. A considerable part of the track work on the State railroads on which the track is more than five or six years old, consists in replacing the bolts which have been worn in the shank or chairs in which the bolt holes have been worn off.

The increase in the expense resulting from the use of the new permanent way will arise from an increase of a little over 8 lbs. a yard, that is, of 5 per cent., in the weight of the rails; for track using wooden ties an increase of 2.8 per cent. in the weight of chairs on pine ties and an increase of 39.4 per cent. on oak ties, and beyond this the use of a third screw and of the wooden ferrules.

We give several illustrations taken from the detailed sheet of drawings which accompanies Mr. Bricka's paper. These include a section of the new rail with the angle-plate joints, a plan and elevation of the chair used on wooden ties, and an elevation of the screw bolt used for both fastenings.

Baltimore & Ohio Improvements at Harper's Ferry.

The Baltimore & Ohio Railroad Company is now engaged in making quite an extensive improvement in its line near and through Harper's Ferry. This consists of a change in the line for a distance of 10,900 ft., beginning at a point near Sandy Hook on the old track and diverging to the northward, passing under Maryland Heights with a tunnel, through solid rock, 800 ft. long, 24 ft. 6 in. high by 28 ft. wide; thence over the Potomac River on a bridge of nine spans, being one span half-through plate-girder 34 ft. 6 in., one span over the canal deck girder 100 ft., one span deck girder 85 ft. 6 in., three spans through truss 140 ft. each, three spans 85 ft. 6 in. each deck girder, making total length of bridge 806 ft. 6 in. to the west bank of the Potomac River; thence by curve to the bluff, thence following along the foot of the bluff westwardly to a point west of the pulp mill, where it again joins the old main line track. A connection will be made diverging from the new line on the westernmost span of the bridge, with the Baltimore & Ohio Co.'s Valley Branch. The new bridge will be located north of the old bridge, about 60 ft. at the east end, and 225 ft. at the west end. The old county bridge will remain in its present location, that is, below the new bridge, and will be for the use of the public as a highway and not subject to dangers of trains as at present.

West of the river, along the foot of the bluff, there will be considerable grading, mostly through the solid rock. The county road on the east side of the river will be changed to conform to the new conditions. The work is estimated to cost about one-quarter of a million dollars.

The plans for this improvement have been under consideration for several years, and have been much discussed, as this is one of the most important bridges on the B. & O. system, being located a few hundred feet above the confluence of the Potomac and Shenandoah rivers, and in the gap through the mountains formed by those streams. At a recent meeting orders were given to begin this work, the intention being to have the line completed and ready for the heavy traffic anticipated on this trunk line during the World's Fair, and the contract for the graduation and masonry was awarded to Messrs. Jones & Thorne, contractors, of Baltimore, on July 11 last, to complete within six months. The grading is now being done at both ends of the tunnel, and considerable progress has been made and the masonry work, which will be built of Gettysburg granite, is being built, three of the piers having reached a point above the danger line of high water on Oct. 1, since which time the work has been pushed. No work has yet been done west of the river, but that can be done by the time the very heavy work east of the river and the masonry for the bridge shall have been completed.

The alignment, beginning at the east end of the new line, is as follows: Two-degree curve for 13 deg. 30 min.; thence tangent nearly through the tunnel; then a 7-deg. curve for 17 deg.; thence tangent across the bridge; then 9 deg. 30 min. curve for 50 deg. and 45 min.; thence tangent through Harper's Ferry, along the foot of the bluff; then 9 deg. curve for 30 deg. 43 min.; then tangent; then 6-deg. curve for 27 deg. 28 min.; then tangent to the connection with the old main line.

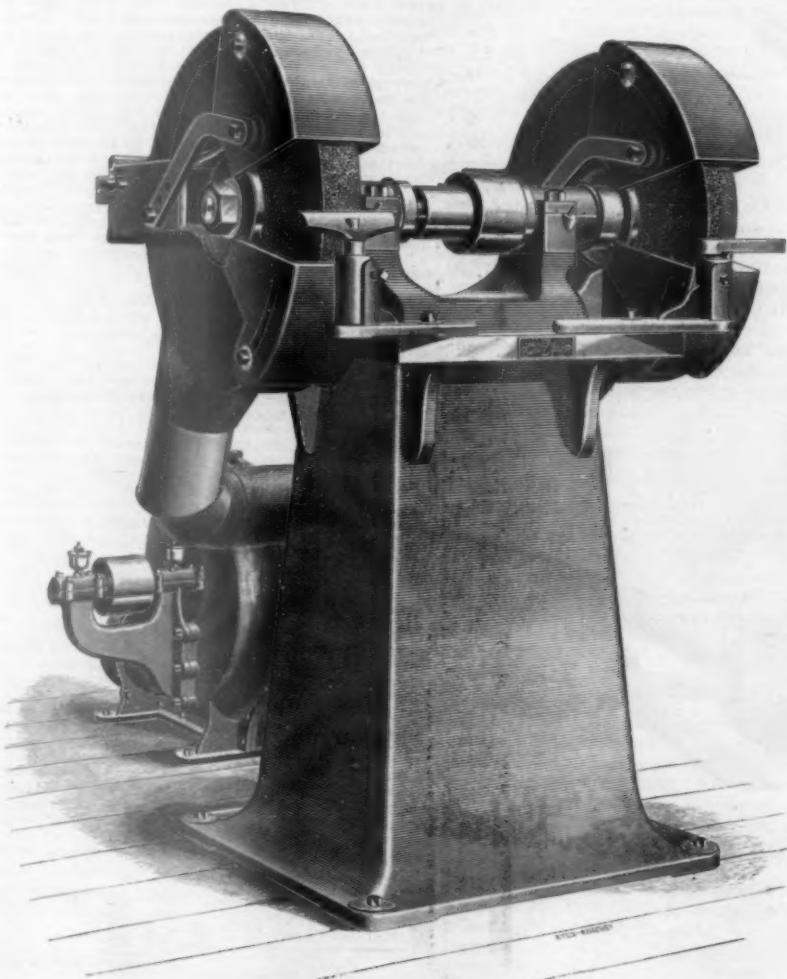
When this work is completed a better alignment will be afforded through Harper's Ferry, and, as the line will be on solid ground, no further trouble will be had from the long trestle now in use along the west bank of the Potomac River through Harper's Ferry. The new bridge will be at a greater elevation than the old one, and will be about 9 ft. above the high water mark at the great flood

of 1880, when it took 11 engines to hold the present old bridge in place.

Use is being made of the stone taken from the tunnel as ballast for other portions of the line, it being crushed to size as it is taken out, and hauled away to improve the roadbed at other points.

Eureka Safety Emery Wheel Hood.

The Springfield Emery Wheel Co., of Bridgeport, Conn., is fertile in new appliances for emery wheels. Among its most important recent appliances is the Eureka safety emery wheel hood, which is applicable to any of their line of dry grinding machines. The accompanying engraving represent the E. Floor Grinder with the safety hood attachment.



Eureka Safety Emery Wheel Hood.

These hoods are made of malleable iron, securely bolted to the machine, thus giving perfect protection to the operator. They are arranged with an adjustable mouthpiece so that the rest can be easily adjusted as the wheel wears away. There is also a rotary dresser in the back of the hood with a device by which the emery wheel can be kept perfectly true and sharp. The hoods are constructed with an outlet to which an exhaust fan may be attached to draw off all emery dust arising therefrom, thus making it not only safe but healthy, as it fully protects the operator from any injury caused by the wheels breaking, as well as protecting his throat and lungs from the dust. The makers claim for this appliance: Absolute protection to the operator; protection to the employer against liability from accident; a trueing device always ready for use; protection from emery dust.

The Development of Passenger Movement.

Among the questions considered at the recent railroad congress at St. Petersburg was that of the results of the means employed to develop passenger movement by return tickets, mileage tickets, zone rates, circular trips, etc. Mr. W. Heuster, Vice-President of the Central Swiss Committee, reported on this subject, summing up the results of statistical information which he had been able to gather. He examined, so far as the varying and incomplete statistics furnished to him permitted, the influence upon movement and upon receipts, of the various combinations and kinds of reduced tariff. He formulates his conclusions as follows.

It is impossible to lay down absolute rules, but the system which has been followed hitherto of making reductions as the need of them has been felt has given good results, and there is no apparent reason for departing from it, at least in countries where the traffic has already been fairly developed. Round trip tickets at considerable reduction seem to best meet the wants of the public, at the same time increasing the movement

to the benefit of the railroads. Reductions in favor of the third class appear to be, also greatly to the advantage of the public and the railroads.

The *Journal des Transports* does not accept M. Heuster's conclusions as being exactly self evident. It cites the example of the English railroads, on which the passenger traffic is probably more intense than on any other railroad systems in the world, and nevertheless the English companies have not carried reduction of fares very low. Round trip tickets at reduced prices are given there only to a moderate extent. Generally the third class, contrary to the continental practice, is not given this reduction, and in the other classes the important companies make a reduction of but 16% percent., and several make no reduction for round trip tickets. The passenger fares, on the whole, are higher in England than on the continent.

But the fare is not the only thing considered in a passenger journey. The real accommodation to the public is in having at its disposition a great number of trains departing frequently and running at good speed. Up to now the people of the continent have not been spoiled in this way, the notion having been that a reduction of fare was enough to content the public. Perhaps this is a mistaken notion. It is true, at any rate, that on the continent, because of the number of reduced fare tickets sold for various reasons and purposes, those who pay full fare are in the minority. For instance, in every 100 passengers, those who travel at reduced rates are 70 in Switzerland, 65 in France, 75 on the state railroads of Belgium and 82 in Holland.

Austria-Hungary has gone to the extreme with its zone tariff, and although the results appear to be good, Mr. Heuster is very doubtful as to the wisdom of applying this idea to countries where the traffic is already developed. M. Louis de Perl, Counselor of State and Director of Interior Service of the Russian railroads, is more severe than Mr. Heuster, regarding the zone tariff. He has studied it with marvelous care, and his communication to the congress is certainly one of the most instructive. His studies make up a chapter of the work which he has just published on the general question of reform in passenger tariffs, a French translation of which will shortly appear. M. de Perl draws the conclusion, from a careful study of official documents, that up to now the zone tariff ends in a deception. The gross receipts remain stationary and the working expenses increase; moreover, it has been necessary to add to the rolling stock, and, finally, long distance travelers have been favored at the expense of those traveling short distances. He concludes that a decisive judgment on the Hungarian reform will be possible only after several years of experience, and when the official figures of receipts and expenditures are published.

Indian Railroad Notes.

The experimental steel making at Coosipur to which I referred in my last letter proved successful, and for the future the new steel projectiles will be manufactured in this country at the government shell factory. If the Indian government would only guarantee to purchase a certain quantity of country-made steel every year, English capitalists would speedily erect steel works in the Salem and Warora districts, as well as in the vicinity of the Bengal coal fields; but until some guarantee is given that country-made material will be allowed to compete on equal terms with imported material there is not much chance of this branch of industry being followed to any great extent. That Indian manufactures have not hitherto had a fair show when contracts for public works have been given out has long been a grievance, and the preference shown by some officials for "home" made material does undoubtedly keep money out of the country.

The currency question is still the chief topic, and meetings largely attended by Europeans and influential natives are being held all over the country for the purpose of memorializing the government to do something. The rupee is now worth a shade less than 1s. 2½d. As the interest on guaranteed railroad stock has to be paid in sterling, the fall in Exchange affects the revenues of the country in more ways than one, and what would otherwise be a fair profit is turned into a loss by the fall in the price of silver.

During the early part of the year the traffic on the East Indian, the Oude & Rohilkund and the Bengal & North-western railroads was the heaviest on record, and some of the other lines did fairly well for some time; but still the total receipts of Indian railroads from April 1 to June 18 was 24½ lakhs of rupees less than for the corresponding period of 1891.

In some cases the scarcity of water—due to the deficient rain-fall last year—caused a great deal of extra trouble, and water had to be carried in trains in order to keep things moving. This year, again, the rains were late, and although in some parts of the country bridges have been swept away and embankments submerged, other places are still crying out for more rain. Prices are still high in districts where the crops failed, owing to want of moisture last year, but all fears of a famine are at an end for the present, and in many divisions there will be bumper crops this season.

The appointment of Mr. F. L. O'Callaghan as Secretary to Government in the Public Works Department has given great satisfaction, not only to the civil engineers, but to the public generally. Mr. Horace Bell succeeds Mr. O'Callaghan as Consulting Engineer to the Government of India for state railroads.

The Pintch gas system of lighting railroad carriages has caught on immensely since I last wrote, and several companies are already erecting gas works at their principal stations. The company which controls this patent offers to send experienced foremen to India to superintend the erection of the necessary buildings and apparatus and teach the Indian workmen how to work the show.

The automatic vacuum brake is being fitted to a large number of vehicles, and in a few months all the passenger vehicles in use on the North Western Railway will be completed. The question of applying a continuous brake to freight trains has been postponed indefinitely. The number of accidents due to trains being turned on to the wrong line shows the necessity for introducing some method of interlocking switches and signals. Saxby & Farmer's apparatus is too expensive for roadside stations where the traffic is light; and on a single track where the up line has often to be used for down trains, and vice versa, it interferes with expeditious shunting, and marshaling. A simple form of wire-lock, which could be easily applied at a low cost, would sell well.

A new proposal has been brought forward for the Nilgiri (mountain) Railway, viz.: Length of line, 48 miles; gauge, 2 ft.; ruling gradient, 1 in 25; cost, 2,300,000Rs.; time for construction, 11½ years. The former scheme was to cost 2,500,000Rs., and take three years to construct on the metre gauge; length, 16½ miles; ruling gradient, 1 in 12½, and goes as far as Coonoor only, while the new scheme would have one on to Ootacamund with a branch to Coonoor and Wellington. Unfortunately the new scheme was too late in the field.

The extension of the Topical branch of the E. I. R., which has just been sanctioned, will open out a large area of new coal fields, and it is estimated that from 30,000 to 40,000 tons per month will be supplied from this source alone when everything is in working order. This, added to the supply from the new Jheriah fields—mentioned in my last—will increase the mineral traffic over the E. I. R. considerably, and insure a plentiful supply of fuel for Bengal industries; but Upper India is still badly supplied with coal.

The Secretary of State for India is evidently in favor of the East Coast railroad being completed as early as possible, for in addition to the large amount already sanctioned for expenditure during the year, he has made an offer of additional funds, if the engineers in charge can contrive to spend them. A good many of us would like to have such a chance.

NUTLOCK.

CALCUTTA, Aug. 22, 1892.

The New Hinckley Brake Slack Adjuster.

We illustrate a modified form of the automatic brake slack adjuster, manufactured by the Hinckley Brake Co., of Trenton, N. J. The new adjuster is designed for use in the lower brake rods at the trucks, some roads preferring to adjust at this point rather than in the fulcrum rod at the centre of the car, as is now done on the roads using the Hinckley adjusters. Both patterns of adjusters, however, accomplish the same result, namely, the automatic compensation for the wear of shoes, thus keeping piston travel constant, at any prescribed stroke. The resulting improvement in the effective power of brakes when this is done is so well known that it is not necessary to refer to it here.

In the illustrations fig. 1 is a general view of the fulcrum rod adjuster, in use for some time past on various

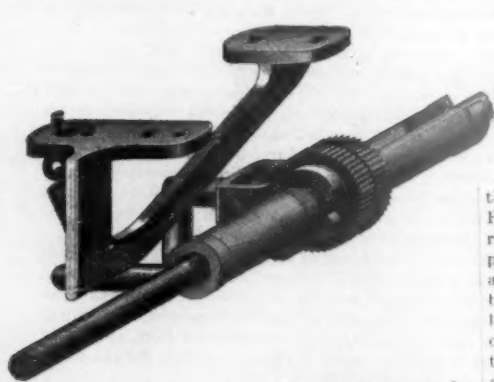


Fig. 1—General View of Fulcrum Rod Adjuster.

roads. Fig. 2 shows the new pattern of adjuster for the lower brake rods. Figs. 3 and 4 are end and side elevations respectively of the truck, showing the method of attaching the lower brake rod adjusters to car.

The new adjuster operates upon exactly the same principle as the fulcrum rod adjuster (fig. 1), but the actuating spring is dispensed with, and a small counterweight substituted, which effects the turning of the swivel and automatic shortening of the lower brake rods whenever the live lever (and consequently the brake piston) exceeds the prescribed stroke. The swivel itself, with its ratchets and pawl, is practically the same as heretofore used, but all springs are dispensed with. Instead of the operating lever traveling down the inclined bracket, the new lever travels up the incline, as shown in figs. 3, 4 and 5, but the shortening of the rod occurs as before, upon the release of brakes, when there is a minimum strain on the rod.

All working parts of the adjuster are enclosed in a dust proof case, the threaded ends of rods being protected as before, by tubes and dust guards. The protecting box in which are the ratchets and pawl (see fig. 2) is formed in one piece with the operating lever (see fig. 1). A dust proof cover is secured over the top.

The operating device is very simple (figs. 3 and 4). Two bent irons accompanying the adjusters are secured by lags or bolts to the edge of spring plank, 5 in. from the lower rod, one on each side. The iron on one side, as at C, fig. 3, has a short inclined piece, or angle, riveted to it, forming an incline upon which the operating lever rides. Upon the application of the brakes, the lever moves with the brake rod, and is carried up the slope, raising the pawl within the box, upward toward the point of another tooth on the take-up ratchet. If this forward movement of the brake rod is sufficient, the pawl drops into the next tooth above, and upon the release of the brakes, when there is but a slight degree of tension in the brake rod, the counterweighted lever drops back down the incline, turning the swivel as it does so and shortening the rod. This is repeated upon subsequent applications, until the slack is so adjusted that the lever does not move far enough up the slope to allow the pawl to again engage a new tooth; nor will it again do so until the wear of shoes gives an increased movement of brake rod, when the operation is repeated, and the wear corrected as it occurs.

When new shoes are to be put in, the adjuster is slackened off by hand from a point outside the line of rails. In the same way it may be tightened up, if, when new shoes are in, it is found that too much slack has been left; although, in the latter event, the adjuster will automatically correct this if left to itself.

The adjuster is purely automatic in its action of reversing the movement of the swivel when slackening off, or when taking up slack by hand. To slack off, the inspector simply works the lever a few times between the vertical line B (fig. 3) and the horizontal positions as indicated by dotted lines at A. To tighten up the rigging the inspector works the lever in the same manner, but on the other side of the vertical position B, as between B and C. In other words, the movement automatically reverses as the lever

passes the vertical position. This slackening off, or tightening up, is very quickly effected; as four movements between A and B, or four between B and C, slack off, or take up respectively, one full inch in the upper brake rod leading to the live lever. The lever is easily reached, by reaching in over the equalizing bar between wheels, from outside the rail.

The attachment of the adjusters to cars is readily made, only requiring the cutting out of 36 in. of the lower brake rod near the spring plank, and welding the ends thus left to the stub ends of the rods on the adjuster. The two side irons (figs. 3 and 4) are simply secured to the edge of the spring plank by lag screws or bolts, in their proper positions relative to lower rod. The distance of the sloping iron from the centre line of brake rod determines the stroke at which the brake piston is to be maintained, and may be set for any stroke desired.

The Relief Department of the Baltimore & Ohio.

Judge Harlan, of the United States Circuit Court, has recently decided the suits regarding the liability of the Baltimore & Ohio Railroad to the old Baltimore & Ohio Railroad Relief Association. The association, it will be remembered, was a separate organization and not a department of the railroad company, and was dissolved by an act of the legislature, upon a petition of certain members in 1889. At the time the railroad held assets belonging to the relief and pension features to the amount of about \$300,000. The Court now decides that, in addition to this sum, the railroad owes \$100,000, which it agreed to contribute to the association at its formation,



Fig. 2—General View of Adjuster as Attached to Lower Brake Rods at Trucks.

but which was never paid in, with interest from March 31, 1889. The Court also decides that the agreement to pay the operating expenses of the association is still binding upon the company, and that this sum, amounting to \$108,000, with interest, should be added to the fund. This will make the entire fund for distribution about \$408,000.

The men who secured the dissolution of the old association were instigated by the promoters of independent organizations of employes, or mere agitators, but they secured practically no following and their failure seems to have been complete. An officer of the Baltimore & Ohio, familiar with the affairs of this department, has given us the following particulars about the change in its character and status:

"The ostensible cause of complaint in the courts was the desire, of certain persons who were members of the Relief Association when its charter was repealed, for a division of the surplus belonging to that institution at the time it was merged into the present department. At that time, March 31, 1889, the Relief Association had some 23,000 members, and, at the written request of the vast majority of those members, that the purposes of the Relief Association might be carried on without interruption, the President and directors of the railroad company established the relief department, and each member of the Relief Association who approved of this change and who desired the continuation of the institution was requested to make an application for membership in the relief department and transfer his interests in the assets of the Relief Association to the new department. Only 900 out of the 23,000 failed to do this, thus demonstrating, in the most practical manner, the faith the employes had in the institution.

"Anonymous advertisements were inserted in the newspapers, requesting all persons who had not made the assignment above referred to, and who were members of the Relief Association on the 31st of March, 1889, to communicate with a certain post-office box in Balti-

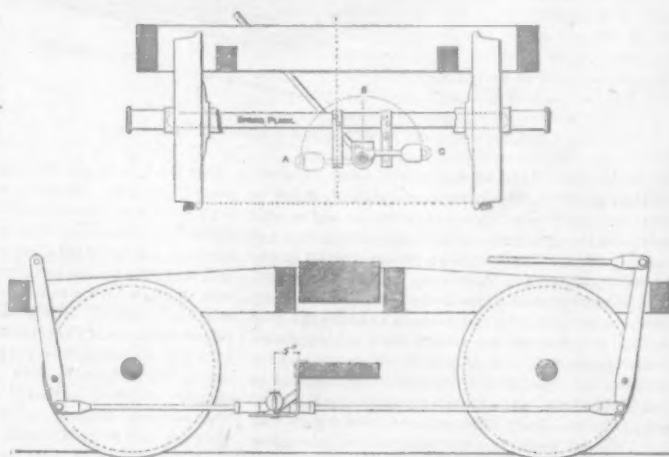
more. Some made such a communication, and received in reply power of attorney to be signed by them, authorizing certain attorneys to represent them in obtaining their proportion of the net assets of the Relief Association. When a number of these had been secured, proceedings were instituted in the courts for the purpose of winding up the affairs of the Relief Association, its charter having been repealed. As the old association had assigned all its assets to the railroad company for the purpose of continuing its operations as the Relief Department, the road was also anxious that the affairs of the Relief Association should be finally closed, and it filed its bill against all members of the Relief Association who had not become members of the Relief Department. This bill was consolidated with the two bills filed by members of the Relief Association.

The judge before whom the consolidated cases were heard decided that receivers for the defunct Association should be appointed. An appeal was taken from this decision, and the Court of Appeals overruled the Court below, and decided that the Baltimore & Ohio Railroad Co. was the proper custodian of all the funds until a final settlement should be made under order of Court, and the case was sent back. Testimony was then taken, and arguments were had, to determine the amount of the net surplus and upon what basis it should be distributed to those who did not assign their interest in the old Association to the Relief Department, and the recent decision was on this point. The judge, however, has merely handed down his opinion, indicating a division on a certain basis, but the decree has not been framed or signed by him, and it is impossible, therefore, to tell what action will be taken. When the question is finally determined, the persons who did not make an assignment will be paid their proportionate amount of the ascertained net assets, and the balance will be placed to the credit of the present Relief Department, thereby making it stronger financially than it has ever been.

"As you know, nearly every organization existing among workmen, whether railroad employes or others, has some kind of insurance or beneficial society connected with it, and many of them require contribution to the beneficial scheme as a condition of membership in the 'Order' or 'Union,' but men are better satisfied to contribute to one like ours, if they have their choice, than to one conducted by the labor organizations. We have demonstrated that it costs them much less for the same amount of benefits, besides being on a far more substantial basis. There is no element of assessment in this institution, as there is in others. Each man is required to pay a fixed sum, for which he is guaranteed by the railroad company the receipt of certain benefits, whether the contributions are sufficient or not. As the railroad company contributes very largely to the support of the institution, we are enabled to do more for the men than any outside society, compelled to pay all of its own expenses and without any guarantee."

Electric vs. Steam Locomotives.

No doubt electrical engineers often think that the steam locomotive is a very wasteful form of steam engine, and that an electric locomotive would be more economical, because it may be driven by a large economical stationary engine. While this may be the case in many instances, it is probably much less so in the better class of locomotives than is generally believed. Too much, therefore, should not be claimed in favor of electric locomotives, simply on account of the mere difference between the coal economy of the stationary and the locomotive steam engine; the chief advantages are to be looked for in other directions. For the benefit of those interested in this subject we publish some instructive data of a standard type of passenger locomotive used in the West, obtained from diagrams made by



Figs. 3 and 4—Side and End Elevations of Truck.

THE HINCKLEY BRAKE SLACK ADJUSTER.

the author, Mr. C. K. MacFadden. For indicated horse powers of 500 to 1,000 he finds that one pound of coal corresponds to 5.11 ton miles, with an evaporation of 8.2 pounds of water per pound of coal. In an electric road there are three losses, namely, that in the generator, in the line and in the motor, which go toward balancing any difference in the coal economy of stationary and locomotive steam engines, and it is doubtful whether there will be much difference left in favor of one or the other when thus compared, especially when it is remembered that it takes three machines, namely an engine, a dynamo and a motor, each of 1,000 h. p., to replace a single locomotive engine of that power. The interest on the capital invested in these three machines must be compared directly with any possible coal economy. There are other differences between electric and steam traction, given repeatedly in these columns, among which the chief advantages of the former over the latter are to be looked for. Steam engines usually give the indicated horse power of locomotives, which figure does not allow for the loss in the engine itself, nor for the power necessary to run the heavy engine alone. In the data given by Mr. MacFadden the engine with its tender represents from one-quarter to one-third of the weight

of the whole train; this ought to be taken into account in an efficiency comparison, as it signifies a reduction of 25 to 33 per cent. in the weight efficiency. Surely an electric motor gives a better weight efficiency than this, especially if the motors are placed under each car. Another important consideration is the cost of repairs of a steam locomotive, which appears from Mr. McFadden's figures to be quite high. This not only represents a direct outlay, but it means also that the locomotive is off duty for a large portion of the time which reduces the earning capacity of the money invested in the locomotive.—*Electrical World*.

We are pleased to see such indications that some of our electrical friends are descending from the regions of misleading enthusiasm and are getting down to facts. The cost of repairs given by Mr. MacFadden, 3.41 cents per locomotive mile, is below the average, but as the cost of repairs on the West End electric street railroad in Boston, which is probably as well managed as any street railroad in the country, is about 1.25 cents per month per car mile, it does not appear that we may reasonably expect any reduction in such expenses by placing electric motors on our cars. Mr. MacFadden's statement, that the indicator diagrams which are published with his article are "As good if not better than those from nine-tenths of the simple expansion electric light engines found in our modern plants," is a severe criticism on stationary practice, as we consider them very poor locomotive diagrams.

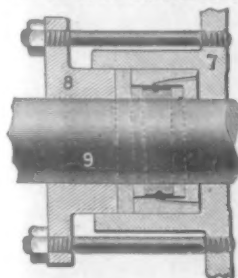
Cars of the Liverpool Overhead Railway.

This line—the first of its kind in Great Britain—will shortly be opened for public service, and great interest is being manifested in the system and appliances adopted. In a recent issue we gave a few details of the cars to be used on the line, and we are now enabled to supplement these with an engraving taken from a photograph of one of the cars. As will be remembered, each train upon this line is to be composed of two cars, and an electric motor is mounted directly upon one axle of the bogie truck at one end of each car. There are two motors to work each train. The speed will reach a maximum of from 20 to 30 miles an hour and the stations average about half a mile apart.

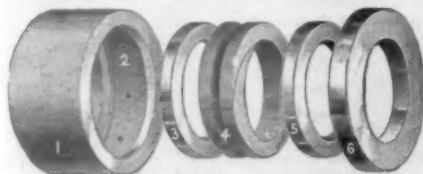
It is hoped that this line will be opened at latest, before the end of the year, when we shall be in a position to give more details and illustrations respecting the electrical equipment wherein the chief novelty seems to lie.

A New Metallic Packing.

The Columbian Metallic Rod Co., of Philadelphia, is introducing a new metallic packing which has some excellent features, and which we illustrate herewith. Referring to the illustrations it will be seen that the packing consists of a cylinder, 1, which is placed in the ordinary stuffing box, and in which the metallic packing proper is contained. This consists of two solid rings, 3 and 5, between which the packing ring, 4, is placed. The three rings are held in the outer casing by a retaining ring and the ordinary gland, 8. In the sectional view small holes are shown in the casing, 1, by which steam is



admitted from the cylinder to the back of the packing ring, 4. The joint against the rod is made by this steam pressure acting on the back of the packing ring, which, it will be noticed, has a long scarfed joint. One immediate consequence of this arrangement is that the pressure with which the packing ring is forced against the piston rod or valve stem is directly proportional to the pressure of the steam in the cylinder or steam chest. When the stuffing box end of the cylinder is connected with the exhaust there is, therefore, very little pressure and consequently small friction in the stuffing box.



Some of the claims made for this packing, and which appear to be quite reasonable, are that it can be applied to any kind of stuffing box without alteration of the box; the old gland is always used; it has a sufficient lateral motion; the packing friction on piston rods is very much reduced during the exhaust stroke and when the engine is running without steam; it only acts as packing when using steam in the end of the cylinder containing the stuffing box; if by accident the packing is destroyed ordinary soft packing can be used with the old glands, and when it requires renewing one packing ring is all that is necessary. The simplicity of this packing is certainly a strong point in its favor and it is being tried on several important railroads with very satisfactory results.

Some Disputed Points in Railroad Bridge Designing.

(Continued from page 811.)

O. F. NICHOLS, M. Am. Soc. C. E.: Advocates concerted action among engineers to secure uniformity in bridge designing, but believes a systematic consideration of the subject and report upon it preferable to an unsystematic and more or less rambling discussion. He also believes that a simple and uniform system of loading is much to be desired. His opinion is that no plate less than $\frac{3}{8}$ in. thick should be used and would make two the limiting number of cover plates with very considerable thickness. He considers the common rules for the use of stiffeners chaotic. Their distance apart at the ends of girders should not be less than the depth, while none are needed at the centre of span. He favors increasing the thickness of web very considerably, even to the thickness of heavy flange angles, if necessary, and would rivet stringers in between floor beams whenever practicable in order to hold the latter in a vertical position. He advocates placing stringers farther apart than rail centres in order to utilize the elasticity of the timber ties and approves the author's proposed floor, although he thinks the bolting a little excessive.

HENRY B. SEAMAN, M. Am. Soc. C. E.: Considers the subject of engine concentrations a very vexatious one, and would be willing to have it displaced by systems of equivalent uniform loads. He shows the inconsistency of making rigidly accurate computations with a set of concentrations that must almost surely be measurably different from those actually in use on any given road, and points out that tender wheel weights are frequently assumed in diagrams without the coal load, making

diately endanger a structure with the usual margins of safety, yet a great number of bridges have so suffered under them that renewals have been necessary. As the main sections of members are more than sufficient to enable them to sustain this added duty, it follows that the weakness has existed in the details of joints, not only of floor, but of trusses also. He is of the opinion that the frequency of loading or the amount of traffic should be considered in the dimensioning of bridge structures. He then shows the effect produced on a structure by the lack of vertical balance of driving wheels, and makes some extended observations on the influence exerted by the panel, whose length is a multiple of the driving wheel circumference.

WARD BALDWIN, M. Am. Soc. C. E.: Observes that an engineer may be frequently called upon to decide whether his bridges are sufficiently strong to carry some special load, in which event he cannot avoid using wheel concentrations. If an equivalent uniform loading is to be employed he seems to prefer that determined from the maximum end shear, as first proposed by Mr. C. L. Stroebel. The fact that the load per linear foot for Mr. Waddell's Class A locomotive is so nearly that of the train at least partially accounts for the close agreement between the stresses due to the concentrations and those found from the equivalent uniform load. He believes that the agreement would be less close if he had selected the Class U diagram.

A. C. STITES, Assoc. Am. Soc. C. E., and LEE TREADWELL, Jun. Am. Soc. C. E.: Contribute a diagram showing very elegantly the equivalent uniform loads for Mr. Waddell's six standard diagrams for spans ranging from 15 ft. to 500 ft. in length.



Car of the Liverpool Overhead Railway.

them much too light. He is apprehensive that the equivalent uniform loads proposed by Waddell will not be attractive to railway engineers; nor would be entirely abandon engine concentrations, but retain them for special applications to existing structures. He does not share Mr. Waddell's confidence in steel as a structural material, and cites the usual objections against it. The drifting test, in his opinion, is valueless for the purpose of detecting incipient cracks. He deprecates specifying the fixed amount of 150 lbs. per linear foot of chord for wind pressure, but would make it dependent upon the length of span. The adoption of the right line formula for compression members does not meet his approval, and he would retain Rankine's modification of the Gordon formula, which he holds is more rational in its origin and easier in its application. He criticises Mr. Waddell's employment of the Launhardt formula for truss members, while he uses constant stresses for girders, on the ground of inconsistency. He does not think, however, that the knowledge of fatigue of metal is sufficiently advanced or exact to warrant its use in bridge design.

J. C. BLAND, M. Am. Soc. C. E.: Heartily agrees with Mr. Waddell in his views regarding the objectionable character of wheel concentrations, but he does not advocate the adoption of equivalent uniform loads. He believes that results equally accurate in character and more simple and easy of application can be obtained by using a uniform load supplemented by a single concentration, the latter to be placed at any point in the span, while the former covers the entire span if necessary. He gives a considerable number of tabulated numerical results to show that the uniform load plus the concentration will give results essentially as accurate as those with the equivalent uniform load. In his computations Mr. Bland makes the single concentration ten times the uniform load per linear foot. These computations show the validity of Mr. Waddell's claims, and also indicate that a uniform load per linear foot covers the case not only for plate girders, but also for articulated structures. Mr. Bland thinks the use of this load is easier in its application than an equivalent uniform load, particularly if it be remembered that the engine should be placed in the train, rather than at one end, for many of the chord stresses. He also believes that wheel load computations engender a very erroneous sense of accuracy, but he does not regard the extra time required a matter of any special consequence; nor is he inclined to deprecate the use of more than one engine diagram if concentrations are to be employed. In considering the proper live load for modern bridges he calls attention to the fact that, roughly speaking, the past 10 years has witnessed an increase in engine weight of 25 per cent. and an increase in car weight of 50 per cent. Although these increments, as large as they are, would not imme-

G. H. BLAKELEY, Jun. M. Am. Soc. C. E.: Believes that the designing of bridges has been very much advanced and benefited by the past use of engine concentrations. It has called attention to the exact treatment of static stresses and stimulated the scientific treatment of all questions connected with bridge design. While he seems to favor the adoption of uniform loads, he thinks that Mr. Waddell overstates the time required by the other method. He contends that the most objectionable feature of the present specifications for moving loads is their infinite variety rather than their discontinuous character. He would reduce the variety to uniformity by the selection of the set of standard loads advocated by Mr. Waddell, in which the wheel spacings would be expressed in even feet, but which would include an additional loading of 80,000 or 100,000 lbs. on two axles eight ft. apart. It is his opinion that the slight additional cost of bridge structures for a small addition of moving loads, which would capacitate them to meet a future increase in weight of traffic, is almost universally overlooked and states that the weight of a bridge designed under one of Mr. Waddell's standards is only $\frac{3}{4}$ or 4 per cent. more than if dimensioned for the next lighter one. He regards mild steel as capable of sustaining more rough treatment, in the line of shop manipulation, than wrought iron. He does not consider reaming or planing necessary for steel under 70,000 lbs. ultimate strength and advocates the drifting test as a very valuable, though not conclusive one. He criticises Mr. Waddell's working stresses as being too high for short spans. In a 150-ft. steel span Mr. Waddell would permit 14,000 lbs. per square inch in the bottom chord, whereas Mr. Cooper would prescribe 11,500.

HENRY W. HODGE, Jun. Am. Soc. C. E.: Would use wheel concentrations for stringers, floor beams, long verticals and similar secondary members, as well as for plate girders, which latter he would limit to a length of 75 ft. He does not think the same procedure objectionable for lattice girder spans up to 90 ft., but for all other spans he believes that a uniform load, with the concentration, would answer every purpose. He does not approve the equivalent uniform load, as it must not only change for every different length of span, but also for the different chord and web members of the same span. If the indirect effect of wind loads is to be considered at all, he thinks that the increased load on the windward stringers should certainly be provided for, although Mr. Waddell neglects it. He approves Mr. Waddell's floor system, but thinks it so expensive that a buckle plate or trough section floor, with ties in ballast, might as well be used. The great variety at present existing in unit working stresses receives his criticism. He even regards the crude English system of a certain number of tons for tension and another number for compression as possessing some advantages over it.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

A correspondent details in another column some of the obstacles in the way of making careless or unprincipled superintendents pay a penalty when they wrong fully use their neighbors' freight cars. We fear that an attempt at the present time to limit the local use and diversion of foreign cars will be about like using a broom against the tide. There never was a time when so many cars were used in through trade as the present, and it is easy to believe the statement that there has never been a time when there was so much misuse of foreign cars. There are many railroads in this country which have on their lines to-day more foreign cars than home cars, and on such roads diversions of foreign cars are well nigh inevitable, so that the evil is promoted not alone by the careless or the unscrupulous but by many others, who can hardly help themselves. How can we expect such use of cars to be curbed by a paltry dollar penalty? Perhaps it would be a blessing in disguise if somebody would use borrowed cars in local short-distance traffic until the evil became so great as to compel resort to a straight per diem system. Theorists tell us that virtue is increasing in the world; but if we are to judge by facts, in the railroad world, it must be admitted that the rule of lending cars and trusting to the honor of the borrower for getting a just compensation, is sadly out of date. The true practice must more fully recognize the universal principle that everybody will look out for number one.

In the last bulletin sent out by the Secretary of the American Society of Civil Engineers there appears a very excellent reminder. He tells members of the Society that the library is a reference library and should contain the published reports of every engineering work in the land. He asks that copies of reports on all kinds of municipal work, railroads, mechanical and marine engineering and operations and the like be sent to the library. In fact this reminder should go to engineers who are not members of the Society, as well as to officers of municipalities and corporations. Pamphlets and documents of all kinds on public works and engineering are classified, filed and indexed at the library, and that work is done now with considerable thoroughness, and doubtless in the years to come a great deal more time and space and money will be devoted to it than has been in the past. The result will be that as time goes on the library of the American Society of Civil Engineers will become a great working collection where people can easily lay their hands on information which to-day cannot be got at all, or, if at all, can be got only by inquiry and investigation through many different channels. One of the most important uses of the American Society of Civil Engineers is just this, and we are sure there is no lack of disposition on the part of the officers or members of the Society to build up such a library; therefore people need not be afraid to send books, pamphlets and documents of all sorts. If the labor outgrows the present working force that will be increased; and if the library outgrows the present space at the command of

the Society, that also will be increased. There will be no lack of money to carry on the work of the Society, if really good and useful work is done.

Most American railroad superintendents have to wrestle, sooner or later, with the problem of stopping the peculations of dishonest conductors. This is a source of worry that is familiar everywhere. But another difficulty, not so often thought of, is that of preventing losses from the inability of honest conductors to get tickets or fares from all the passengers. One road which recently made a careful examination, found that seven per cent. of the tickets sold for certain trains were not taken up. The investigation was continued for some time, and on many trains, long enough to show that, practically, one out of every 14 passengers gets off the train with his ticket still in his pocket, to be used at some future time. This showing was on way trains, of course. Many officers will claim that this is an unusually bad record and that, on their roads, they have no such looseness. But even half this loss would be a serious leak, and we all know, from the nature of things, that this is a feature in which American railroad management is at fault everywhere. That the leak exists, even under the best care, is evident from the experience of a large Western road which recently adopted the practice of limiting all local tickets to one day after the date of sale. This rule leads to the prompt presentation of unused tickets for redemption, and the number thus presented became so large as to almost startle the officers of the road. We do not bring up this subject for the purpose of announcing a new remedy for the evil for we have none. But "a disease known is half-cured," some one says; and it will be well to at least know just how the matter stands on your road. In discussing the subject of watching dishonest conductors we have several times remarked that there was ample need and justification for closer and more constant inspection of all kinds of conductors, honest or dishonest. Any manager who takes pride in perfect service must see that such inspection is valuable in many ways. As long as we cannot adopt the English fashion of fencing platforms and compelling passengers to buy tickets at any cost of delay or inconvenience, the general elevation of the morale of the conductors seems to be the only hopeful chance for making improvement; that is, on those roads which, like those west of Chicago, have limited all their tickets. Why do not the Eastern roads try that experiment? We hear of no feeling but increased satisfaction among those who have maintained the practice longest.

The Value of the Standard Code Illustrated.

The testimony before the coroner brings out quite clearly the circumstances that led to the startling collision near West Manayunk, Pa., on the Philadelphia & Reading on the morning of Oct. 24, when seven persons were killed and 30 or 40 injured. The accident was of peculiar interest to the public not only because it occurred near a great city and the train was well loaded, but because just at that time the company announced that it had ordered automatic block signals for 200 miles of road; and numerous editors have been trying to figure out how such signals would protect a train running in the wrong direction on a double track road.

The passenger train was running south on the northbound track. The station agent at Pencoyd received an order to hold the northbound freight train for further orders, but about 14 minutes afterward he received another telegram telling him to have that freight train take 50 empty cars from a certain track, and he assumed that this second "order" annulled the holding order. He let the freight train go and a terrible disaster resulted. The exact phraseology of the telegrams is not published, but enough is disclosed to show that this agent's lack of training and his consequent failure to appreciate the full meaning of the word "order," or the importance of a train order and the vital necessity of scrutinizing every word of such a document, was the immediate cause of the collision. The first message was signed Whitcomb (division superintendent) and the second was signed Rupp (yard master), but both came from Rupp's office, two or three miles south of Pencoyd, and both were actually sent by him. Probably the agent knew this but his blunder was without any possible excuse, nevertheless. Apparently he was not a telegraph operator.

Every railroad man familiar with the standard code, or with any strict system of duplicate train orders, will at once say that the lack of such a system was the true cause of the collision, and the facts shown fully

justify that view. It is true that ordinary attention to the signatures should have prevented this blunder, and the Reading road may claim that station men as inexperienced or as thick-witted as this one are to be found where the standard code is used, but such a claim may fairly be answered by the statement that the accessories and the methods of procedure prescribed by the standard code tend strongly to guard against the ill effects of such incompetency. Whether we call it an advantage or a disadvantage, it is a fact that the standard code is more safely operated by poorly qualified men than is any other system of moving trains by telegraphic orders.

The first point in which the practice on the Reading would be improved by the adoption of the standard code is in the matter of an outdoor signal. It appears that nothing but a red flag was used at Pencoyd. If there had been a fixed signal, connected to the office, and if the regular practice had been for the dispatcher to require an explicit statement from the station operator that the signal was displayed, the habits of the operator would in all probability have been such that he would not have taken down the signal without an equally explicit order. Apparently, orders for the movement of trains were copied and delivered on ordinary paper, the same as other messages. If the practice had been to write them on a special printed form the station agent probably would not have overlooked the signature. This station is near the Philadelphia terminus; the terminal yard limits are said to extend to Pencoyd, and the yardmaster, Rupp, at the terminus, controls train movements for several miles out on the main line. The order to keep northbound trains out of the way of the passenger train was, therefore, sent from the dispatcher's office, at Reading, to Rupp, and by him transmitted to the stations within his jurisdiction where it was needed. Most superintendents and dispatchers will at once condemn the system on this bare statement, and they are doubtless right; although the Reading officers would probably claim that on a crowded road, possibly with inadequate facilities, their plan was the only feasible one. The yardmaster must have all possible resources to enable him to clear his yard in case of an impending blockade. But this hardly answers the criticism. Either the dispatching section should have been made shorter, or, if the yardmaster must have control of a short section of road, an absolute block system should have been in use. With such a system the yardmaster might interfere with the dispatcher's operations, but he could not do it to the extent of introducing a serious element of danger. Assuming the yardmaster and the dispatcher to be of equal general ability, the latter would be most likely to guard against slips of all sorts, simply by reason of his more thorough experience.

There seems to have been no real necessity for sending this order to the station man and not to the conductor and engineer. In other words, the duplicate order system, under which the freight conductor would have received the same message that was sent to the passenger conductor and thus would have known why he was being held, might just as well have been used. It is common to assume that we must train every man to obey an order without knowing why he obeys it, but in this case both the conductor and engineer of the freight train were new to this part of the road and the knowledge that they were held for a passenger train would have put them on their guard so that they would not have so readily concluded that the message about the cars annulled the order referring to the right of road.

This lack of acquaintance with the road is another feature of the affair that merits strong condemnation, though if the men had been fit in all other respects this would probably have done no harm in this case. Both conductor and engineman were practically green. The conductor had worked as brakeman here two years ago, but this was his first trip as conductor. The engineman, according to the report of the coroner's inquest, accepted the station agent's statement as to the sufficiency of the telegraphic order which was shown to him. This indicates that he not only was unacquainted with the road, but also that he did not realize the gravity of his responsibilities. An engineman who has to ask a stationman, or any one else, what orders to accept and what to refuse, is unfit for his place. Nothing is said about the character or experience of the agent. His operator, however, had been there but three months and had been an operator only one year.

Steel Fireboxes.

One of our English contemporaries has discovered that the steel fireboxes of American locomotives are justly comparable with glass tumblers and that our

locomotive builders are still groping in dark ignorance of their business. This discovery is announced thus:

"It has always been stoutly contended in the United States that there was nothing like steel for fireboxes. In this country steel has had an extended trial, and has been pronounced inferior to copper. American engineers and steel makers said that such a conclusion only proved that we did not know how to make or use steel. The truth has, however, an awkward habit of coming out. We cut the following from a United States railway journal. It may be an evidence of peculiar stupidity, but we confess we prefer to use in fireboxes a material which cannot be cracked by a bucket of cold water."

Then follows a quotation from the *Railroad Gazette* about the evils of washing boilers with cold water. In concluding, the *Engineer* says:

"Would these plates crack if filled up with hot water on a frosty day? Tumblers will, but they seldom crack when filled with cold water while they are heated to 212 deg. which is the maximum temperature of a steel firebox when the fire has been dropped and the manholes opened, unless indeed there happens to be a red hot brick arch in the box."

Now, let us see about all this. When a fire has been dropped, the boiler emptied and the dome cover taken off, or other aperture opened, the pressure is the same as that of the atmosphere, and therefore the temperature of the vapor in the boiler cannot be greater than 212 deg. But the *Engineer* forgets the large mass of iron in the grate bars, which in many cases remain at a much higher temperature than the boiler vapor and continue to radiate heat to the firebox sheets. Also, the fire brick arch does not need to be "red hot" to raise the temperature of the firebox sheet considerably above 212 deg. And, the local heating by the fire brick arch is conducive to cracking even if the arch is not "red hot."

But the most important matter which the *Engineer* omits to mention is the length of our fireboxes being, as they are, nearly twice as long as those on English locomotives. They are in fact large rectangular boxes of metal, held on all sides by stays. These boxes can be made so large that no metal could stand the expansion and contraction caused by washing with cold water while hot. Perhaps the American sizes are such that copper would crack too; at least it is true that in the United States, where copper is made into sheets as ductile and as pure as in England, copper fireboxes have not done as good service, for the money expended, as steel, and this, too, in a country where the feed water is of an inferior quality unknown in England, and also where locomotives are driven to about two and a half times the rate of combustion common where copper boxes are exclusively used.

American engineers are neither stupid nor timid. If steel was unsuitable for fireboxes, it is safe to say it would not be universally used on the thousands of locomotives that are being driven daily to a degree that requires the use of 100 to 150 lbs. of coal per square foot of grate per hour. Still more true does this seem when one remembers the progressive spirit which American railroad men show in other features of locomotive construction. It is this progress that has given some Englishmen to cry out "knavery, deceit and boodle," when orders from the colonies go to the United States because of the lethargic spirit that prevents the English builder from realizing that he is behind in the race and because he builds engines to-day as they were built years ago just from force of habit and not because newer types have been tried and found wanting. Kick as hard as ever he will, the English railroad officer will have to recognize the value of other United States railroad improvements just as he has had to copy the compressed air brake, the swiveling truck and the sleeping and dining car. Of course it will come hard to follow with the steel firebox, but hard as it will be for him, the English locomotive builder will follow, just as the French, Germans and Belgians are following, but with this difference, he will be at the tail of the procession.

After all, it is a little absurd to discuss the value of steel for the firebox of internally fired boilers or the relative merits of English and American steel with disputants who ignore the example of their fellows, the marine engineers, who use nothing but steel for vast numbers of marine boilers, using a forced draft of three inches or so of water. To-day what English marine engineer would object to steel for fireboxes? None; because his contact with the outside world has shown him the value of looking for the best and most practical instead of following blindly the easy paths blazed out by his predecessors. Even now the Midland Railway and one Indian railroad, at least, use Yorkshire iron for boiler shells. When they comprehend the comparative value of steel for shells it may be they will make a fair trial of steel for fireboxes also.

But really, has not the *Engineer* in its desire to help English locomotive builders regain their losses in the markets of the colonies mistaken an honest discussion in the *Railroad Gazette* about the relative merits of handling boilers for a confession of weakness in de-

sign. It would appear so from the fact that steel fireboxes are almost universally used in portable, marine and some other types of English boilers frequently illustrated in our contemporary's column.

Rapid Transit in London and Elsewhere.

Those of our readers who are interested in city rapid transit probably read the article on rapid transit in London which appeared last week. The conclusion reached by a careful reading is that the question is as difficult in London as it is in New York, Chicago and Boston; and that the probability of one great, comprehensive and final plan being worked out and adopted there is about as far off as it is here.

It has seemed to us that the plan of the New York Rapid Transit Commissioners, details of which are now in preparation, will ever be financed by private enterprise. It is loaded with conditions that make the prospect of earning an attractive interest on the great investment too remote. In London the tendency to impose forbidding conditions is much stronger than it is here, and further, the preliminary studies for a comprehensive plan of work are not so far advanced.

The article in the *Quarterly Review*, from which ours of last week was condensed, helps to clear the ground in London and will have a useful influence; but there are two or three points on which the writer might perhaps accept a Yankee suggestion or two. He rules out, it will be remembered, elevated ways and shallow tunnels or subways, and concludes that deep tunnels, like the City and South London, are all that is left to consider, and this in face of the fact that the existing deep tunnel railroad in London is not remunerative. Of course in one review article such a complicated question, involving great elements of engineering, traffic and finance could not be treated conclusively, but we cannot accept the reviewer's results without a good deal more argument than he presents.

Overhead tracks he dismisses because they would be "an unmitigated nuisance" to passers below, because they would darken the streets, and because London streets are crooked and hilly. It would be well for anyone thinking on this matter to dismiss at once the notion of the nuisance to people in the street below. That is a survival. For years the writer of these lines has walked about half-a-mile, under the tracks of the Manhattan elevated, as often as four times a week, and the inconveniences that he has suffered from trains passing overhead have been trivial. He has never had clothes soiled by those fabled drippings of oil or dirty water of which the newspapers like to talk, and the only thing that he can possibly grumble about is an occasional light shower of particles of coal, blown out by the exhaust in starting from stations. Probably that would cease with the use of compound engines; and, at worst, it is nothing compared with the fall of soft coal soot to which the inhabitants of London, Chicago, Cincinnati and St. Louis are used. The topography of London streets is unquestionably against a good system of elevated railroads, but why not buy the right of way through property and build on somewhat straight lines? That may yet be the upshot of the matter in London as well as in New York. The cost will be great, of course, and so will the advantages; but in neither case does it seem probable that such a scheme of elevated railroads can ever be carried out by private means.

The writer in the *Quarterly Review* rules out railroads of the class of the Metropolitan (London underground) as costing too much for right-of-way and construction. It is quite true that the Metropolitan and Metropolitan District are not so remunerative as to attract capital for other like enterprises; but we do not understand that this is necessary from the nature of things. We have long supposed that the great obstacle to large net earnings on these lines is that they cannot pick up a large short trip business in the crowded districts. Just there lies the great success of the elevated railroads of New York. They do attract a large short trip traffic. From figures that we examined just about a year ago it was apparent that over half the earnings of the Manhattan system are from traffic beginning and ending on the lower half of the island. It appeared that during the hour of maximum travel every seat on the Third Avenue line earns 2.1 fares and that on the Sixth Avenue line between the hours of 2 and 3 P. M., when one can always find empty seats, and when the passengers going far up town are very few indeed, every seat earns 1.4 fares. Taking the whole day through every seat on these two lines earns about 1.4 fares. Now the great moral from this is that if you wish to earn interest on money invested in a rapid transit railroad, through one of the great cities of the world, you must serve the short trip passengers.

Just here comes in one of the great objections to a deep tunnel system. To make it available to short trip

passengers and attractive to them you must have power lifts and frequent stations and you at once add enormously to the cost of construction and of working.

Such are a few of the conditions to be thought of when one attacks "rapid transit" in the great cities. Meanwhile we call attention to the magnificent doings of the New York elevated railroads during the Columbus festival as recorded in our issue of Oct. 21, and to the very promising start that has been made in Chicago in the same direction, and we suggest that there is a certain practical quality about this Yankee notion of an elevated railroad that is likely to carry it very far yet.

The Reading in New England.

The alliance of the Boston & Maine and Philadelphia & Reading railroad systems naturally suggests estimates of the probable increase of their joint traffic. What new construction will be necessary to perfect the union? How does the New York & New England road happen to be a factor in the situation? Will the prospective gain in the interchange of business be confined to freight, or will it include passenger movement as well? To answer these questions requires considerable study of the existing railroad mileage of the eastern and middle states and knowledge of the general "lay of the land."

In the first place, then, there is at present no actual connection between the two systems. Where they come the nearest to each other they are 35 miles apart, over an existing road, or 37 miles over the shortest practicable route for a new line. Meanwhile the New York & New England affords a feasible, though circuitous connection.

The financiers who are now at the head of the Reading and the Boston & Maine, and, it is asserted, control the New York & New England, also propose to greatly increase the interchange of traffic between the communities which they traverse on either side of the Poughkeepsie bridge. How will they do it as a physical matter of transportation, and what are the prospects for success as a commercial venture?

The nearest approach of the Philadelphia & Reading to the Boston & Maine system is at Simsbury, Conn., a point on the Philadelphia, Reading & New England road (formerly the Hartford and Connecticut Western and more recently the Central New England & Western) an arm of the Philadelphia & Reading, which extends east of Poughkeepsie to Hartford. In like manner the nearest approach of the Boston & Maine to the Reading is at Northampton, Mass., the western terminus of the Central Massachusetts line. Northampton and Simsbury are 25 miles apart by the Northampton division of the New York, New Haven & Hartford. This piece of alien property is used by arrangement as a part of the "Poughkeepsie bridge route" to bring the Boston & Maine and Philadelphia & Reading into contact.

One of the earliest results of the new alliance would naturally be the building of 37 miles of road from Bondville, Mass., on the Central Massachusetts, 18 miles east of Northampton, by way of Chicopee and Springfield to Tariffville, Conn., on the Philadelphia, Reading & New England, 11 miles northeast of Hartford and four miles northeast of Simsbury. Quite likely the Boston & Maine will extend the Central Massachusetts from Bondville to Springfield, and the Philadelphia & Reading at the same time push its track from Tariffville to Springfield. This is by no means a new project. Both extensions have been surveyed and, we believe, located. The Boston & Lowell company had the scheme all worked out on paper, including a branch from Chicopee Falls to Holyoke, before its lease to the Boston & Maine, and the Reading's maps in the railroad guides have for a long time shown the line from Tariffville to Springfield and thence to Bondville as projected track. The work would be for the most part light, except through the cities of Chicopee and Springfield and bridging the Connecticut River.

One consequence of all this would be to put Northampton again off at the end of a branch road. Another would be the further development of Springfield as a railroad and commercial centre. Incidentally, the Boston & Albany would find a new competitor in the field for its valuable local business. The distance from Boston to Springfield by the Albany is 90 miles; by the Boston & Maine it will be about 100. In passenger transportation the Boston & Albany has nothing to fear. The Boston & Maine would capture a fair share of Springfield's freight, as well as of Holyoke's and Chicopee's.

It was said above that there might be one question as to the construction of this "missing link." Here the New York & New England comes in. The Boston & Maine has another branch besides the Central Massachusetts, stretching out in the direction of the Philadelphia & Reading. This is the Worcester, Nashua & Portland division, with its southwestern terminal at Worcester. The New York & New England already connects the Boston & Maine at Worcester with the Philadelphia & Reading at Hartford, by way of the Norwich division from Worcester to Putnam and the main line from Putnam to Hartford. At no point besides Worcester do the Boston & Maine and New York & New England meet, except in Boston. There are possibilities for an interchange of traffic between them by boat across the harbor from South Boston to East Boston or Charles-

town, but immediate rail contact is confined to Worcester. The distance from Oakdale, where the Central Massachusetts crosses the Worcester, Nashua & Portland, to Tariffville, via Putnam & Hartford, is 103 miles, against 83 miles via Bondville and the projected line through Springfield. From Boston to Tariffville the two routes are of almost exactly equal length.

If the New York & New England turns out to have been "harmonized" it will, of course, be used for the present to supply the gap between the Central Massachusetts branch of the Boston & Maine on the east and the Philadelphia & Reading on the west. It may, indeed, be utilized all the way from Worcester to Poughkeepsie, and not merely to Hartford, through the new road of a dozen miles in length recently built from Hopewell Junction, on the New York & New England, to the bridge. But whether the New England is "in it" or out of it, the supposition is that the direct short line from Bondville to Tariffville will be constructed by the Maine or the Reading, or both, at an early day.

Now, as to the business prospects, and first with regard to passengers. Physical and social conditions are such that the Poughkeepsie Bridge route can never become a "great trunk line" of travel between Boston and Buffalo and the Northwest. Its distances are all against it. The great bulk of travel is bound to go by the most direct and quickest routes. Between Boston and Buffalo the Hoosac Tunnel route, made up of the Fitchburg and West Shore roads, is and always will be the short line. The distance is 480 miles. The next shortest is made up of the Boston & Albany and New York Central, 499 miles. The best possible mileage by the Boston & Maine and Reading, including the proposed cut-off through Springfield, is 711 miles—106 on the Maine from Boston to Springfield, 247 on the Reading from Springfield to Slatington, Pa., and 358 on the Lehigh Valley from Slatington to Buffalo. The disparity between 480 and 711 miles is too great to be ignored for first-class travel. In the immigrant business it would make less difference.

When, therefore, President McLeod says that "this alliance will greatly add to the passenger traffic of the Boston & Maine, not only from the travel incident to the commercial and business interchanges between the regions traversed by these lines, and the improved facilities afforded for its accommodation, but through an efficient and united through service similar to that now in operation over the Reading system between Washington and New York," he, of course, refers to travel between New England and Philadelphia, Washington and the Southwest. In this field there is more to encourage hope.

The Poughkeepsie Bridge affords the only all-rail line to the southwest below Albany, though the transfer of entire passenger trains, both day and night, around New York by boat between Harlem River and Jersey City, comes little short of affording "all-rail" service. The trains between Boston and Philadelphia by the "Steamer Maryland route," in fact, are quite as apt to make time as those all-rail by the present "Poughkeepsie Bridge route," so that there is ample room for the improved "efficient and united through service" which Mr. McLeod promises. But notwithstanding all possible improvements in service, the distance from Boston to Philadelphia by way of Poughkeepsie will continue to be at least 415 miles, against about 330 miles by way of Harlem River; while in the point of time, though the Quaker City express, by way of Poughkeepsie, requires 12 hours to run from Boston to Philadelphia, the Colonial express, via Harlem River, goes in nine hours. So far as first class travel originating or ending in Boston is concerned, therefore, Mr. McLeod would seem to have an uphill task to bring about any extraordinary increase. For travel between Philadelphia and the South on one hand, and the White Mountains and the Maine coast on the other, his prospects appear somewhat brighter. Through sleepers will no doubt run next summer between Washington or Philadelphia and Fabyans and Bar Harbor over the Poughkeepsie route.

But after all, both in general railroad economy and in this particular instance, the freight traffic is the more important. Mr. McLeod's statement that "the Reading controls through its Lehigh Valley line, the best line, having the lowest grades between Buffalo and the lakes and tide-water," is significant as regards the commerce of Philadelphia and New York. How much it may mean in connection with Boston, whose freight movement via Poughkeepsie must be over the hills of western Connecticut, is uncertain. That a very considerable through traffic may be built up is of course not to be questioned. Nevertheless, the chief advantage of the new relations to both the Maine and the Reading companies is probably expected to come from an increased all-rail movement of coal from Pennsylvania into New England, and the importance of this is apparently greatly overrated by many of the general public, if not by those inside the "deal."

The shipments of grain from all western points continue heavy and the total shipments of all freight, except live stock, eastward from Chicago were about 30 per cent. greater last week than the week before, and about equal to the shipments by lake, which is quite unusual. The stocks of grain in elevators at New York are very large, and the same is true at Buffalo and the other lake ports, but grain dealers at all these places persist in saying that there is not such a complete block-

ade as the press despatches have reported. The movement is active, and it is claimed that the reports of "blockade" are sent out for the purpose of favoring some particular road or line. At New York the New York Central notified consignees of over 300,000 bushels of grain that they must take it away at once—in other words that storage capacity was scarce and that any delay would involve extra cost for handling and possibly an increased storage rate; but the grain men claimed that the road was pressing them unreasonably, and that the trade would be "destroyed." The trouble seems to be that, the magnitude of the grain movement being very large as compared with the facilities, even in ordinary seasons, the railroads have come to give the consignees very much larger concessions than they deserve, all the time. Their business being large and important they are allowed to override all rules, and use cars for storehouses in a way that would be regarded as outrageous if practiced with other freight. Now, when the road claims its rights, or a part of them, it is accused of causing extensive damage. The canal boats continue to get plenty of grain at Buffalo, and six cents a bushel is said to have been paid last week on grain to New York. The export movement of grain is only moderate, so that if grain continues to come from the West as it has been coming there will be a blockade, whatever may be said about the present condition. A Sioux City dispatch of Tuesday reported rain, and the hope was expressed that the farmers would be compelled to stop shipping grain; but one swallow does not make a summer. The price of wheat for December delivery dropped in New York on Saturday to 78½ cents a bushel, the lowest price for many years.

Our St. Paul correspondent summarizes the traffic situation there as follows: There is the usual shortage of cars in the Northwest that always comes when the movement of the wheat crop is at its height. Each year the conditions are different, and the scarcity this fall is largely due to the farmers in the wheat country being in better condition financially than for several years past. The crop of '91 was the greatest in the history of the country. It followed short crops, and in some sections almost total failures, for three or four years. The farmers, in consequence of the light crops, were in debt, and it required all the money they realized in '91 to pay their bills and make them even with the merchants. This year there has been another large crop, not as large as that of '91, but far ahead of the average yield. The result is that the farmers have money to spare and are expending it in buildings and other improvements, as well as for new farm machinery and other things that they have by force of circumstances been compelled for several years to get along without. All of this means a heavier movement of merchandise west. Nearly all the cars are returned to the country, from the markets, loaded, and therein has arisen a new factor in the demand for cars. Then again the roads reaching the Southwest as well as the Northwest have use for their cars in that section, which they did not have last season. Then the crops in the Southwest were almost a complete failure, while this year they have been very large. Last season much of the wheat was held back because of the "hold your wheat" circular. Now this wheat is being rushed forward to market, and, together with the crop of '92, makes a much heavier movement than was anticipated at the commencement of the season. There will probably be no abatement of the offerings until the close of navigation on the lakes, after which grain to the seaboard must pay the higher all rail rate. So far the roads have been able to keep all the primary markets open. That is, they have been able to supply enough cars to keep the elevators along the lines in condition to receive grain from the farmers. The latter are shipping less grain on their own account this fall than for several seasons past; hence there is not the usual cause for complaint from that source. All the roads, with the possible exceptions of the Chicago & Northwestern and the Chicago, Minneapolis & St. Paul, have experienced less trouble than usual, and there are no indications of a blockade or anything approaching one.

In addition to the data on the passenger traffic at Chicago in the Columbus week, which were published last week, we are now able to add the following: The Pennsylvania lines carried during the three days, Oct. 20, 21 and 22, 7,413 passengers into Chicago, which is about three times the ordinary traffic. The Wabash took into Chicago 24 trains on those three days, consisting of 80 coaches and chair cars and 43 sleepers. This amounts to about 6,500 passengers in all, not including suburban trains. From the figures which we have been able to gather and from the estimated excursion business of the roads from which no returns have been obtainable, it appears that the number of people from outside of the suburban district who visited Chicago during the dedication exercises was about 120,000.

Strong efforts have been made lately to create interest in various devices for applying brakes automatically at danger points if an engineman attempts to run past a signal set at "stop." The idea is very old, but there are several new ways of carrying it out. It is not a notion that we have ever favored, the reasons against it seeming to us many and weighty; but perhaps we are wrong and are falling "behind the times." Concerning one

such device we have just received the following from the General Manager of a great railroad system: "We are not favorably impressed with the utility of the appliance, but made some inquiries about it some time ago, and are very doubtful as to the advisability of its use. We fear the tendency would be to make the engineer careless when approaching stations or fouling points, causing him to rely too much upon the automatic operation of the device, so that, all things considered, its use may cause as many accidents as it would prevent. Our practice, and so far our preference, is to use derailing switches at railroad grade crossings and the more dangerous fouling points covered by our block and interlocking signal systems." This is a matter on which the experience or theories, or both, of railroad officers would be particularly interesting now that the subject is being pushed to the front.

Our readers will remember that at the last Master Mechanics' Convention, when the subject of firebox steel was up for discussion, Mr. Smith, Superintendent of Motive Power of the Chicago & Northwestern, member of the committee on tests of iron and steel, brought forward a specimen of firebox material that had been used for twenty years, and was in good condition when taken out. It was claimed at the time that the steel was made by the crucible process. Mr. S. Wellman, of the Wellman Iron & Steel Company, has made an analysis of this steel, and in a letter to the *Railroad Gazette* says: "It is a characteristic analysis of the open hearth steel made about twenty years ago by the Bay State Iron Company. The analysis is as follows:

Silicon.....	.005	Manganese.....	.450
Sulphur.....	.044	Carbon.....	.13
Phosphorus.....	.050		

The silicon is low, the phosphorus rather high, the manganese moderately low, and the carbon low." In order to determine if the material was made by the crucible process, Mr. Wellman procured a sample of some crucible firebox steel made lately. The analysis was as follows:

Silicon.....	.005	Manganese.....	.120
Sulphur.....	.025	Carbon.....	.35
Phosphorus.....	.027		

About this Mr. Wellman says "the silicon is high, phosphorus low, manganese low, carbon high; all very characteristic of crucible firebox steel. So far as my experience goes, it is next to impossible to make crucible steel show as low silicon as .005 or carbon as low as .13; therefore, I am sure that the steel in question was not made by the crucible process at all, but by the open hearth process." The matter of analysis of steel was well discussed at the last Master Mechanics' Convention, and those of our readers who are interested in the matter will perhaps find some useful information in the discussion given at that time in the *Railroad Gazette*.

The California Traffic Association has asked all legislative candidates in that state to make a definite pledge to favor the railroad legislation advocated by the Association, and Manager J. S. Leeds states that he has already received 200 favorable replies from candidates, only one man appealed to refusing to sign. The pledge sent out by Mr. Leeds presents the subject under six heads: (1) A bill should be passed compelling railroads to pay up their taxes. (2) The constitution should be immediately amended so as to abolish the railroad commission and allow the legislature to regulate rates directly. (3) This bill should be submitted to the voters for ratification during this year's session. (4) A bill establishing maximum tariffs should be passed as soon as the constitution is changed. (5) A new commission should be established, with duties similar to those exercised by the Iowa Commissioners. (6) no adjournment should be consented to until all this work is done.

NEW PUBLICATIONS.

Der Verkehr Londons, Mit Besonderer Berücksichtigung der Eisenbahnen. Von Gustav Kemmann. Kaiserlicher Regierungsrath. Mit 8 Plänen und zahlreichen, in den Text gedruckten Abbildungen. Berlin: Verlag von Julius Springer, 1892. 4to, pp. 197. \$10.00.

[The Traffic of London, with Especial Regard to Railroads.]

This elegantly gotten up work embodies the results of examinations made by Mr. Kemmann under direction of the Technical High School of Berlin in the disposition of the revenue of the fund founded by Louis Boissonnet.

In thoroughness of investigation, completeness of statistics gathered, and in logical and systematic arrangement of the contents, the compiler has left little to be desired, and the publisher is entitled to no small praise for the beautiful manner in which the work has been printed and published and the numerous illustrations prepared. Accompanying the text there are seven large folding plates of maps of London and its surroundings and diagrams illustrating the amount and direction of the traffic on the several lines of communication, and 88 smaller illustrations in the text, comprising views of the principal centres of traffic and railroad stations in London, plans showing the location of different important lines and diagrams of locomotives.

The first division of the work comprises general introductory remarks on the traffic of Great Britain. The author first speaks of the remarkable geographical position of Great Britain and its effect on the development of traffic of all kinds, and proceeds to summarize the

foreign traffic, subdividing it into freight and passenger traffic, and again dividing the latter into travel to the Continent and travel to other foreign lands. Next the coastwise traffic of Great Britain is treated; then the inland traffic, both freight and passenger. The methods of handling the inland traffic are next considered—first generally, followed by a discussion of the special characteristics of the management of railroads in Great Britain, and then by a detailed analysis of the work of railroads in Scotland, Wales, Ireland and the city of London. The various railroads are classified under three heads, those which are distinctly passenger lines or freight lines, or lines combining both kinds of traffic. A general summary of the business done by the British railroads in the year 1888-9 concludes the first division of the book.

The second division treats of the traffic and its distribution in London in general. This section is also very systematically arranged, beginning with a brief statement of the extent and character of the development of the city of London during the present century, followed by a description of the boundaries of London and a discussion of the economic relations of the several districts of the city, the facilities afforded for distribution of material by water, and the methods of distributing fuel and food supplies for this enormous population. It appears that in the year 1889 there were brought into London 12,630,726 tons of coal. The data for the provisioning of the city are not brought down to as late a date, but in 1885 there were brought into the city 11.5 million bushels of wheat, 400,000 head of cattle, 1,500,000 sheep, 1,300,000 calves, 250,000 hogs, 8,000,000 game and birds, and about 65 million gallons of beer and liquors!

The fourth division is an analysis of the general plan of traffic, subdivided with the same minuteness which characterizes the previous portions of the work. An interesting part of this chapter is that relating to the statistics of travel on the streets. The number of persons entering the city proper from the suburban districts was counted at eight points for a week in April 1891, employing 800 men and using up 36,358 blank forms at a total cost of about \$6,000. The result of this count was that there were found to enter the city proper on foot and in vehicles 1,121,708 people, and besides, three railroad stations delivered 108,835 persons into the city. From the observations made, it was estimated that there were regularly employed inside the city proper, but not residing there, 301,331 men, 50,416 women and 21,305 children. On Feb. 11, 1890, a count was made of the number of vehicles and pedestrians passing given points on some of the most thronged streets during the twelve hours from 8 a. m. to 8 p. m., with the following result.

Locality.	Vehicles.	Pedestrians.
Cheapside, at Foster's Lane.....	13,316	96,228
Newgate street.....	10,532	44,314
Holborn Bars.....	14,301	59,455

For comparison with this statement is given a statement of the street travel in Berlin at certain points on one day in 1891 for the 16 hours from 6 a. m. to 10 p. m.

Vehicles.	Pedestrians.
Friedrichstrasse and Unter den Linden.....	120,016
Königsstrasse, under the Stadtbahn.....	10,016
Potsdamer Platz.....	17,268

The statistics of horse car travel have not been obtained by the author from official sources, but from one of the London guides he has drawn the information that in 1887 there were nine companies operating 114 miles of tramway, and employing 8,222 horses and 958 cars with which they carried in the year 143,241,402 passengers.

In the oldest and central portion of the city, the only means of transportation on fixed route is by omnibus. The extent of the omnibus travel may be judged by some statistics which the author gives, compiled from a guide-book, and which for the year 1887 are as follows:

Point.	No. of lines.	Average number of omnibuses passing per hour, for 14.5 hrs each day.
London Bridge.....	19	245
Cheapside.....	23	267
Oxford street.....	15	162
Strand.....	14	118

In 1888, there were plying within the city of London 656 omnibuses every day. The companies employed for the service 10,933 horses, and were estimated to carry during the year 116,000,000 passengers.

The author states that it is only recently that tickets and mechanical indicators have been used on the omnibus lines with the result of sensibly diminishing the solicitude of the guards and drivers to secure passengers and their attention to the comfort and convenience of passengers. In former times when there was no check upon the guards in the matter of fares except the use of "spotters" along the route, both guards and drivers were noted for their extreme eagerness to secure all the fares that they could. The company had a general idea that an omnibus ought to return \$10 a day, and if less than this amount was returned by any guard he was put under supervision. It was not an uncommon circumstance for the guard and the driver to divide between them more than they turned into the company, especially on the lines of heaviest travel, but recently there has been a very great change in this respect. In the first half of 1888, the daily revenue from each omnibus of the General Omnibus Company was a little over \$11. The annual revenue from passengers and rentals amounted to \$1,500,000, and an additional revenue of about \$23,000

was derived from advertisements on stages, and about \$5,000 from the sale of manure. The wages of drivers and guards amounted to \$390,000. After the construction of the Metropolitan Underground Railway the dividends paid by the omnibus company fell from 12½ per cent. to 5 per cent., and the value of their stock dropped from 225 per cent. to 100 per cent.

The excellent cab system of London is next noticed, and the steamboat traffic on the Thames.

In Section III., the management of the English railroad systems, and the passenger and freight traffic, the different classes of tickets and rates of fare are described at considerable length. Section IV., gives elaborate statistics of the capitalization and of the operation of the several railroads in and around London.

Section V., occupying 53 pages, gives a very full analysis and description of the arrangements for passenger traffic and the operation of the roads in London, classified under the heads of, first, long distance traffic, and, second, city and suburban traffic. Each line of railroad is separately described and a map given showing its location and connections. The different classes of locomotives are illustrated by diagrams, and the operation of the roads so as to enable them to carry the greatest number of passengers to their destination in the shortest time is described at considerable length. It is interesting to note that the lack of terminal facilities in the City proper, towards which all the routes converge, obliges the roads to run an enormous number of empty trains in the morning and afternoon to accommodate the travel. It is stated that there are daily 529 empty trains run in and out of London, making 725 train miles, and for this and the switching service 672 locomotives are daily in service, making 940 miles a day.

The London underground railroad traffic is very thoroughly discussed, and the author states at the end that "Mr. Jeans speaks very decidedly of the depreciation of property in the districts traversed by the underground roads." He says that in their vicinity, in consequence of the tremor produced by them, many more houses are vacant than anywhere else in London. Especially in South Kensington, and in other regions where dwellings of the better class are erected, the depreciation is very great, although the taxable value of property in that district is continually increasing. Mr. Kemmann adds to this that the deeper located roads like the City & South London are free from most of the objectionable features of the underground road.

Of the new system, the deeper located electrical railroads, the author speaks in very high terms. Of the City & South London he says: "The ventilation in the tunnel leaves nothing to be wished for; every train drives the air before it, and the column of air behind follows correspondingly and finds exit at the stations." It would be interesting to know how the passage of this train-piston of about half the area of the tube drives the full column of air in front of it. It is to be feared that the author did not make such personal examination of the operation of this subterranean travel as would enable him to speak with authority on the subject of ventilation. A later observer, and one who is himself an electrician, Mr. Robert M. A. Lloyd, stated in the *Electrical World* that "The absence of ventilation in the tunnels is the most conspicuous feature of the entire installation. A little air does go into the elevator cars when they are opened at the top of the shafts and walks out with the passengers at the bottom, but any one whose windpipe has not been already seasoned by the steam roads underground can do nothing but gasp while in these electrical tubes."

Section VIII. is devoted to the freight traffic of the London roads, and Section IX., which concludes the work, comprises general remarks on the development of the London railroad system.

Taken altogether, this is a valuable and interesting work. A very large portion of the information contained in it is drawn from official sources, but the author has evidently been unable to procure from some of the companies owning and operating lines of travel any recent data, and has been obliged to resort to unofficial publications, such as guide books of London published four or five years ago. While the authority for nearly every one of his statements is given, it is difficult, in looking over the book in order to obtain information on any particular point, to tell at a glance whether the returns are up to date or several years old. This detracts somewhat from the value of the book as a work of ready reference; but it probably was impossible for the author to obtain the most recent statistics on all the subjects treated, and he has done the best that could be done under the circumstances.

Simple Lessons in Drawing for the Shop. By Orville H. Reynolds, Chief Draughtsman Northern Pacific Railroad, Terre Haute: Debs Publishing Co. Price \$1. This enterprising house is making a specialty of literature of value to locomotive runners and firemen and mechanics in locomotive shops. It already has quite a line of books of this class. The one which is now noticed is just published, and it looks like a very simple and practical little hand-book. It tells what the instruments are that are needed; how to take care of them, and how to handle them, and then gives some elementary lessons in drawing, including something of the theory of projection and of shading, but not of shadows or perspective.

Spon's Tables and Memoranda for Engineers. By J. T. Hurst; 11th edition. New York: Spon & Chamberlin, 1892. Price 50 cents.

The principal novelty of this book is its size, it being 2¼ x 1¼ x ¼ in. It contains a good many useful tables, and from its very small size will doubtless be found convenient by engineers in shop and field work. Its usefulness is considerably impaired, however, by the fact that the index is not alphabetical.

Journal of the Association of Engineering Societies. September, 1892.

The September issue of the Journal contains a paper on the Nicaragua Canal, by Mr. O. B. Gunn; another on Experiments on Punching Steel Plate, by Mr. C. H. Benjamin and a discussion of the report to the Western Society of Engineers on the Railroad and Harbor Problem in Chicago. An abstract of this latter discussion appears elsewhere in this issue.

TRADE CATALOGUES.

Catalogue of Special Wood working Machinery. Greenlee Bros. & Co., 225 West Twelfth street, Chicago, Ill., September, 1892.

Of course, everybody who buys or uses wood-working machinery knows what Greenlee Bros. & Co. make; but we suppose that it is "good business" to publish such a handsome and expensive catalogue as the one which that company now issues. It is a quarto of 88 pages, including an index, is printed in at least four colors and illustrates many of the machines made and sold by the company in perspective, and some in detail by dimension line drawings. The output of this house is acknowledged to be of very high character, as is shown by extracts from letters scattered through the catalogue. The makers say that "if a machine of their build is equalled by that of any other make, they either improve it or stop its manufacture." Among the machines shown are hollow chisel mortisers and automatic mortising machines in considerable variety of size and style. A new machine of this class is the double, compound, automatic mortising machine, now illustrated for the first time. This is designed particularly for door mortising, and is said to be by far the fastest mortising machine ever built, either for soft or hard wood. This has four chisels with two tool carriages in line, directly opposite each other. One or more chisels can be used at a time, and the stroke of the tool carriages can be varied up to six inches. The range of mortising is from ⅜ to ¾ of an inch. Another new machine is an automatic car gaining machine, which has a number of novelties, and has been introduced by several car works and some of the largest railroad companies. Other machines are horizontal boring machines, saw tables and automatic cut-off machines.

The Butler Drawbar Attachment Company's Catalogue and Price List. Cleveland, O.

We are told that the company, "in presenting this catalogue, do so, knowing that the service requires something better than commonly used. . . . The illustrations show various applications in which the 'Butler' can be used and will be fully understood by practical mechanics. The price lists fully explain the parts and sizes." All of this is true and it would be what the reporters call "a work of supererogation," to add anything to what the company says; therefore, we shall not attempt to paint the lily, but advise the reader to get the catalogue.

Natural Gas in Chicago.

The project of piping natural gas to Chicago from the Indiana gas fields has been frequently mentioned since the work was done on the pipe line. The company has now nearly finished its system of distribution, and early in November will begin the delivery of gas to consumers in Chicago. The pipe line consists of two steel 8-in. pipes from Greentown, Ind., where the principal station is, to the Illinois State line; from this point to the city limits two steel 10-in. pipes are used, and in the city the pressure is further reduced to the distributing pressure of ½ in. of water, and 30-in. cast iron mains are laid. The length of the pipe line from Greentown to the city limits is about 125 miles, and it is laid in nearly a straight line. The 8-in. pipes are extra heavy, and were tested at the works before shipment to a pressure of 1,300 lbs. to the square inch. The joints are made with extra heavy steel couplings which are screwed on the pipes until the ends meet, and then the joint is completed by casting a ring of lead in a recess turned in the ends of the coupling and calking this joint. Each section of pipe as laid was tested to a pressure of 60 lbs., and made perfectly tight. It is said that a length of 60 miles of the pipe was pumped up to this pressure and held it for 31 days, with a loss of but three or four pounds. To allow for expansion and contraction the pipe is laid in a sinuous course, the curvature being sufficient to allow for a change in length of 8 ft. to the mile. In making the pipe joints a mechanical arrangement for screwing up the couplings was used with which it was possible to make joints at the rate of a mile of pipe a day. It is expected that the gas will be supplied by natural pressure, which is 300 lbs. to the square inch, until the consumption becomes too great for this, when the pumping plant, which is already erected, will be put into operation. This gas has a high calorific value and will be supplied to consumers in Chicago in the territory now reached by

the company's lines, that is, between Fortieth street, south and North avenue, north, at the rate of fifty cents a thousand feet. At this rate it is an economical fuel for household purposes and, further than this, as the Indiana gas has a very distinctive odor it is free from the dangerous features of the Pittsburgh natural gas, and of water gas.

The Locomotive and Carriage Works of the Great Eastern Railway, England.

Some interesting and extensive details concerning the shops and factories of one of the smaller English railroads have recently been placed before an English technical society, in connection with a visit to these works which was paid by the members, and inasmuch as they serve very well to show the systems and appliances more or less in vogue among the English railroads, it may be worth while reproducing in these pages some of the leading particulars thus officially given.

The Great Eastern Railroad Company's works were opened at Stratford—a few miles outside of London—in the year 1847, and now occupy a total area of 52 acres, of which the shops alone cover 13. The number of hands employed at these works is about 4,800. The company's rolling stock consists of 546 tender engines, 357 tank engines, 3,785 carriages, 16,118 wagons, and 925 road vans, which are renewed and kept in repair mainly at these works. The whole of the new stock—to the extent of, say, 78 engines, 312 carriages and 728 wagons per annum—is also built at Stratford. Of the carriages 1,200 are lighted by compressed oil gas, and all engines and carriages used for passenger trains are fitted with the Westinghouse automatic, compressed air brake.

Locomotive Department.—The erecting shop is 348 ft. by 142 ft. It has four bays, the two centre ones are used for erecting purposes, and 50 engines can be handled at the same time. The company has at present on hand in this shop some new four-wheel coupled, mixed traffic engines. It was in this shop that a quick piece of work was recently done in the way of erection, a locomotive of the goods engine type being built complete in 10 working hours. It was commenced at 9 a. m. and turned out in a finished condition at 9:15 a. m. the following day. In the erecting shop there are four 30-ton and one 15-ton overhead traveling cranes, worked by flying ropes, traveling at a velocity of about 2,200 ft. per minute, also four 3-ton hand cranes. The main portion of the drilling on the pits is done by "Stow" flexible shafts. There are also portable machines for cutting off tube ends, boring and facing cylinders, facing slide valve faces, dome tops and tapping stay holes.

In one corner of this shop there is a 50-ton testing machine, fitted with Wickstead's patent self recording apparatus, which gives stress diagrams of the tests. Bending, compression and tensile tests are here made of boiler and frame plates, etc., and records kept. In the laboratory, tests are made for determining the constituents of iron, steel and other materials, the calorific value of coal and oil, the properties of water, etc. Above the north bay is a shop in which Westinghouse brake work is fitted up and repaired, and there are also brass finishers, etc., working here.

In the machine shop, which is 144 ft. by 138 ft., there are 180 machines, comprising lathes, planing, slotting shaping, drilling and milling machines, the latter being a special feature. "Twist" drills are used almost entirely, and are for the most part made in the works.

In the iron foundry there are three cupolas, two of about three tons capacity each, and one of seven tons. There are two overhead traveling cranes, one 15-ton hand gear, and one 10-ton, driven by square shaft running the full length of the shop. About 40 tons of castings are turned out per week.

In the boiler shop there are six overhead traveling cranes driven by flying ropes. The greater portion of the riveting is done by means of two fixed and four portable hydraulic riveters, worked by special pumps and accumulators, two of the portable riveters being specially designed for foundation and fire hole rings. A large punching press for operating upon engine frames and capable of dealing with plates 1½ in. thick is worthy of special mention, as are also the horizontal and vertical plate bending rolls in this shop.

In the flanging shop there are two hydraulic presses for flanging and stamping plates, worked at a pressure of about 1,600 lbs. per square inch, giving on the 20-in. ram of the large press a total pressure of about 220 tons. Boiler, firebox, and other plates connected with engine and tender work are flanged here. The plates are lifted by a specially constructed crane, and are heated in a gas furnace, the gas being supplied from Wilson's patent gas producers, of which there are four outside the shop, two being in use at a time. Six other furnaces are also supplied with gas from these producers.

In the steam hammer shop, stamping by means of blocks and dies is carried on to a large extent. Four gas furnaces are in use, supplied with gas fuel from the Wilcox producers. As compared with raw coal fuel, it is found possible with these gas furnaces to obtain at least one extra heat per day.

In the wheel shop there are two powerful hydraulic presses for pressing the wheels on and off the axles; these are worked by pumps, which give a pressure on the ram of 200 tons. Turning and slotting the wheels, tires, axles and crank axles and other work of a like

kind is all carried on in the wheel shop, among the tools employed being six lathes with 8-ft. face plates.

Carriage and Wagon Departments.—The erecting shops in these departments have usually from 20 to 40 carriages in hand, according to requirements. Coal wagons and cattle trucks are the chief output in this department, which has separate saw mills, and also a shop for the manufacture and repair of wheels. In the boiler house attached to the wagon department saw mills are three stationary boilers of the locomotive type, fitted for burning liquid fuel in combination with solid incandescent fuel.

Close by is an oil gas works in connection with the train lighting. After generation the gas is washed on its way to the gas holder, and then compressed into cylindrical holders to 11 atmospheres. There are five of these holders in use, each capable of holding 12,500 cu. ft. of gas. The receivers on the carriages are charged to a pressure of seven atmospheres. The carriages fitted for burning this gas are most of them charged at Stratford, but traveling gas holders are sent to Enfield, Palace Gates, Wood Street, Woolwich, Chadwell Heath Loughton and Harwich to charge carriages stopping over night at these places. The average amount of gas made in winter is about 160,000 cu. ft. per week at atmospheric pressure, and in summer about 80,000 cu. ft. per week, or about 3,000,000 cu. ft. in six months. The boiler which supplies steam for working the compressing engines burns, as fuel, the tar which is a by-product from the manufacture of the gas.

Liquid fuel is also used in the boiler shop for two of the rivet furnaces; the rivets are heated quicker than with coal furnaces and are not scaled to such an extent. The furnaces are also heated to the required temperature in much less time, and the heat is more under control. The oil injectors are worked by air at a pressure of 25 lbs. per square inch from a reservoir used during the winter for the Lucigen lights employed in the yards. As already detailed in this journal (see *Railroad Gazette* for Feb. 26, 1892) the Great Eastern Railway has been one of the foremost in experimenting with liquid fuel on its locomotives, and so far the success attending these experiments has been good.

TECHNICAL.

Manufacturing and Business.

The New York Locomotive Works in Rome, N. Y., were sold Oct. 27, at Referee's sale. They were bid in by Ralph N. Ellis and William B. Isham, of New York, and Thomas H. Stryker, of Rome, a committee representing the first consolidated mortgage bondholders, for \$197,074, subject to the first mortgage of \$150,000 and interest from Aug. 1, 1891. The petition of the trustees for the voluntary dissolution of the company had been allowed a few days before the sale, and T. H. Stryker and E. Comstock, of Rome, appointed permanent receivers. The purchasers have not yet decided when to start up the plant, though it will probably be put in operation soon, but not as a locomotive works.

The John A. White Co., of Dover, N. H., write to us to say that since our recent notice of their "Woodworker's Manual" they have received a number of requests for a copy of it from persons who suppose that it is issued for gratuitous distribution. The work contains no advertising and the company is unable to furnish it free, but will be glad to send a copy, postpaid, for 30 cents.

The Congdon Brake-Shoe Co., announces that on Nov. 1 the general offices of the company were removed from the former location, 1016 Monadnock Building, to the works at Fifty-ninth and Wallace streets, Chicago, where all communications should be addressed in future.

The East Coast Manufacturing Co., of New York city, sends us a sample book of asphalt roofings. These roofings are adapted for buildings used for various purposes, and the company is preparing to enter the field with a car roofing as well.

Iron and Steel.

The capacity of the West Duluth blast furnace will be increased to 200 tons of pig iron daily. The West Superior Iron and Steel Co. has contracted to take the entire output for the next five years. Ore from the Mesaba range will be supplied by P. L. Kimberly & Co.

New Stations and Shops.

The shops of the Georgia, Carolina & Northern are to be located at Abbeville, S. C., which is about half way between Monroe and Atlanta. The citizens of Abbeville offered 15 acres of land and \$15,000 in cash for the shops to be located at the town.

The Wilkes Barre & Eastern will soon begin work on a two-story 100-ft. stone brick passenger station in Wilkes Barre, Pa.

Big Pumps.

One of two new pumps furnished by the Henry R. Worthington Co. to the Consolidated Coal Co., of Frostburg, Md., has been placed in the new shaft of that company. These two pumps have been ordered for the purpose of draining the flooded Hoffman mine. Each pump is required to raise 1,000 gallons of water a minute 250 ft., with a steam pressure of 60 lbs. per sq. in. The steam cylinders are 22 in. diameter and 18 in. stroke, and the pumps 12½ in. diameter and 16 in. stroke. Each pump

*At present a number of first class saloons and about 20 suburban third class carriages are being turned out.

has four plungers, each pump being connected by outside rods secured to heavy cross heads. These plungers are outside packed and made of bronze, as are their stuffing boxes. This material has been used to avoid the rapid destruction by corrosion.

Measuring the Rise and Fall in Waterways.

Mr. F. J. Smith describes in *Nature* a unique method of observing the rate at which a river was rising after a fall of rain as follows: The river was a considerable distance from the spot where its height was to be known. By means of the combination of two organ pipes and a telephonic circuit described in the following lines, I have been able to make the required measurements within rather closer limits. At the river station an organ pipe was fixed vertically in an inverted position, so that the water in the river acted as a stopper to the pipe, and the rise or fall of the water determined the note it gave when blown by a small bellows driven by a very small water-wheel. A microphone was attached to the upper end of the organ pipe; this was in circuit with a wire leading to a town station at some distance; at the town station there was an exactly similar organ pipe, which could be lowered into a vessel full of water while it was sounding. By means of a telephone the note given by the pipe at the river was clearly heard at the town station; then the organ pipe at this station was lowered or raised by hand until it gave the same note. The lengths of organ pipe under water at the two stations were then equal, so that the height of the water in the distant river was shown. The determination can be made in less than a minute by any one who can recognize the agreement of two similar notes. The arrangement when first tested was so placed that the height of water at two places near together might be easily compared. I found that a lad with an average ear for musical sounds was able to get the two heights to agree within one-eighth of an inch of each other, while a person with an educated ear adjusted the instrument immediately to almost exact agreement. The total height to be measured was 17 in. A difference of temperature at the two stations would make a small difference in the observed heights. For instance, taking a note caused by 250 vibrations per second, a difference of 10 deg. C. between the temperature of the two stations (one not likely to occur) would make a difference of about 0.02 ft. in height, a quantity of no moment in such a class of measurements. The organ pipes were of square section, and made of metal to resist the action of the water.

The International Railroad Congress on Signals. At the St. Petersburg meeting of the International Railroad Congress the subject of signals formed the sixteenth and seventeenth questions. The summing up of the Congress follows: With fixed signals the tendency is more and more to make the normal position "stop." Such points as drawbridges, junctions and grade-crossings, as well as the more important stations, are all subject to this rule. For stops on the open road and for stations of minor importance, the normal position at "clear" seems to be preferred. With block signals and single track way, the normal position is always stop. On the contrary, on double track roads the normal position of block signals is generally clear. There is a tendency to unite the operation of telegraphic signals from one block station to another, with that of the visible signals, so that the position of the latter shall be actually controlled from block to block. As to the automatic operation of signals by passing trains, this section of the Congress concludes that existing conditions do not justify faith in their safety. The tendency among the railroad administrations is to the use of petroleum instead of vegetable oil for lighting signals, as well as to the use of more powerful burners than were formerly employed. The hope is expressed that very important results will be arrived at from the use of electricity. In testing colored lenses for signaling purposes, the rule is laid down that they should be tested not by sun light, but by the actual artificial light with which they are to be used.

Pintsch Gas Lighting.

In our last week's issue we stated that Prof. J. E. Denton's report on Pintsch gas and oil lighting showed that the heat generated from oil as used in car lighting is fifty per cent. greater than that from Pintsch gas. To avoid misunderstanding we should have said that this is true when the candle power is the same.

Dead Woods.

The Vanderbilt lines are taking the dead woods off their freight cars, as they are no protection when the Master Car Builders' vertical plane coupler is used. This is an important step, and will undoubtedly lead to the removal of dead blocks by many other lines, which look to the large lines for example. The reason of the non-utility of dead woods in connection with the vertical plane coupler has been explained before in the *Railroad Gazette*.

The Frost Carburettor Light.

The following information as to car lighting on the Pennsylvania system is given out by the Railroad Lighting & Manufacturing Co.: The Pennsylvania will light its coaches on the lines east and west of Pittsburgh with the Frost Carburettor, and have ordered of the Railroad Lighting & Manufacturing Co. lights for 500 cars. Equipment for 400 Pullmans and 2,000 other cars will follow. These lines have 776 cars now equipped.

Launch of the U. S. S. Olympia.

The Union Iron Works of San Francisco has issued invitations to witness the launching of the 20-knot protected cruiser, No. 6 on Nov. 5. This cruiser will be named "Olympia." The displacement of this ship is 5,870 tons, and the indicated horse power is to be 13,500. The main battery is to consist of four 8-inch and ten 5-inch breech loading rifles, and the secondary battery comprises fourteen 6 pounder and six 1 pounder rapid fire guns and four gatlings. The ship is fitted with six torpedo tubes. The Union Iron Works has built five cruisers for the United States Navy, 13 merchant steamers and one light ship. The merchant ships range in size from one 30 ft. long to one 346 ft. long and of 5,000 tons displacement.

Lake Roland Elevated Railway.

The construction of this road in the city of Baltimore is now well under way and it is probable that the entire road will be in running order by next spring. The railroad is closely allied to the Lake Roland Park Land Co., and both are controlled by parties in Kansas City. The iron work is about 4,100 ft. of the entire electric line of 11 miles. It starts from grade in North street, south of Saratoga street, and runs in a northerly direction to a point north of Eager street making about 3,700 ft. of continuous double track viaduct with lattice girder spans of from 40 to 80 ft., and two pin-connected through spans, one 200 and the other 150 ft. long. In addition to the elevated structure proper there is necessitated an elevation of tracks outside of the thickly settled portion of the city. This is the Quarry viaduct, consisting of three spans of riveted lattice trusses, each 130 ft. long. The total weight of iron work, including roofs, mentioned below, is 3,400,000 lbs., of which the elevated structure proper, weighing 2,700,000 lbs., has been let to the Pennsylvania Steel Co. The Variety Iron Works have the contract for the Quarry viaduct and also for the beams and roof trusses of the power, boiler, engine and car houses.

Railroad Exhibit at the World's Fair.

The Old Colony Railroad will make an interesting exhibit at the World's Fair. One of the old stagecoach cars which has been rebuilt, where parts were missing, under the direction of Mr. John Lightner, who built the original cars, will be exhibited alongside of one of the latest Pullman vestibule cars built for the same road. The exhibit will also include one of the old Griggs locomotives built for the Providence division, with which will be shown one of the present standard Old Colony locomotives.

The Berne Compressed Air Street Railroad.

The city of Berne, in Switzerland, has a street railroad, about 1.86 miles long, with an average grade of 11.6 per cent. along the whole line. This grade made animal traction inexpedient, and compressed air was, therefore, adopted as a means of propulsion, the Mekarski system, so successfully used in France, being employed.

The compressed air is stored in reservoirs on the cars under a pressure of from 30 to 40 atmospheres, and is used in double cylinder engines, also on the cars, much as the ordinary locomotive practice. The compressed air is mixed with a certain proportion of steam with the view of preventing the very low temperature from the expansion of the compressed air in the engine cylinders. The admixture of steam is secured by passing the compressed air, on its way to the engines, through a reservoir on the car containing superheated water (the temperature of the water being about 165 deg. C., or 329 deg. Fahr.). The compressed air is thus heated and becomes saturated with steam. During expansion of the air in the engines a higher temperature is consequently maintained than would be the case under ordinary circumstances. The cars have 10 axles each, and each carries underneath the floor seven compressed air tanks made of $\frac{1}{2}$ -inch sheets, double riveted. An additional welded tank is, moreover, carried inside of each car under the seats. The tanks are connected in two series, each of which may be independently drawn from. There is a separate compressor station for supplying the tanks on the cars, the power for working the compressors being furnished from a 70 H. P. turbine plant. The speed of the cars ranges from 12 to 15 kilometres (7.5 to 9.3 miles) per hour.

Electric Heaters.

The *Western Electrician* published last week an illustrated description of the Ahern electric heater, which is being used to a considerable extent in Ottawa, Canada. Most of the heaters which are described are of small capacity and are intended for heating water in drug stores, barber shops, bar rooms, etc., but some have been in use for heating water in residences, and also for heating street cars, and one has been put in for kiln drying lumber. The last will take a current of 20 amperes at 50 volts, and the charge will be \$250 a year, the price being based on the current lamp rate. The charge for a one and one-half gallon heater using 3 amperes at 50 volts appears to be \$36 a year, the current being used in this heater only four hours a day. The charge for other small heaters appears to be about the same. An 8-gallon heater has been placed in a residence which takes 9 amperes at 50 volts, the rates charged being one cent per ampere hour by meter. Another residence heater takes 5½ amperes at 50 volts and heats the water in a 63-gallon bath tank which is 18 in. in diameter and 4 ft. high, and supplies three bath rooms and the kitchen sink. This is an experimental plant, but the charge would be

\$300 a year. It is said that a street car heater 29 in. high and 11 in. outside diameter, and using 6 amperes at 500 volts, is equal in heating power to the ordinary coal stove. It would seem from the above rates that electrical heating is, as might be supposed, very much of a luxury. Certainly \$200 a year is very much more than would be necessary to pay for gas to do the amount of heating required in a residence for the purposes mentioned.

Separation of Grades at Elizabeth, N. J.

Work on the Pennsylvania elevation through Elizabeth, N. J., is progressing rapidly. On Thursday of last week travel was abandoned on the two eastbound tracks from a point near Bayway at the south, to North avenue at the north end of the city. At these points switches have been placed connecting all four tracks, and signal towers erected. The westbound tracks will be used for all travel through the city until the elevation of the eastbound tracks is completed, which it is expected will be done by Feb. 1. The foundations for the Chestnut street crossing bridge are about completed and excavation has been begun on the foundations of the Magnolia avenue bridge. Nearly all the timber for the trestles of the two tracks about to be raised, has been framed and lies in the yard ready to be erected. Work has also been begun on the foundations of the stone arch at the Broad street crossing.

Good Roads.

The Commercial Club, of Indianapolis, Ind., has issued a call for a road congress to be held in that city Dec. 6, 7 and 8. The object of the congress is to stimulate the appreciation of the importance of good roads and to make an organized effort to give Indiana the best road system in the country. It will be composed of delegates appointed by boards of County Commissioners, Municipal Governments, Commercial Organizations, etc.

Col. A. A. Pope has sent a letter to a number of railroad presidents urging that each company establish a road department for the purpose of aiding in promoting the improvement of the common roads of the country. It is urged that railroads would find it advantageous to make special concessions in rates on all road material and road machinery delivered to points on their lines, and that perhaps it would ultimately prove profitable to railroads if they were to deliver without charge material and machinery to be used on highways directly connected with their stations. Throughout the United States the condition of the common country roads is the index to the prosperity of railroads. When highways are impassible, freight and passenger earnings are necessarily diminished and the price of railroad securities lowered; when the roads are in good condition, merchandise is accumulated at the depots, and in moving it trains are delayed and accidents increased. A uniform good condition of roads would enable railroads to handle freights more expeditiously and advantageously. Good roads are the means by which a country is built up populously and prosperously; bad roads delay civilization, and cause districts to be sparsely settled, and poverty and ignorance to abound. Every railroad corporation can request its officers, agents and employes to do what they can to create a right sentiment in regard to the improvement of highways in their respective neighborhoods, and all along the various lines depot masters and freight agents could report to a road department, established by the company, the condition of the roads in their towns and what is being done to improve them. These depot masters could be furnished from time to time with pamphlets containing instructions for the construction and maintenance of highways, for distribution to persons doing business at their stations, and thus educate them how to build better roads, as well as teach them that better highways effect saving in transportation. Any railroad running through a territory having good roads must have a great advantage over a competing line with poor roads from its stations. To Colonel Pope's letter very favorable replies have been received from a number of the presidents of various large railroad systems.

THE SCRAP HEAP.**Notes.**

A Division Superintendent of the Northern Pacific has been fined \$50 for "overworking employes."

The shops of the Grand Trunk at London, Ont., were recently damaged by fire to the extent of over \$40,000.

A "National Convention of Surface Railroad Employes" was held in New York last week, and Mortimer O'Connell, of Jersey City, was elected President.

A St. Paul dispatch states that the Great Northern has advanced the wages of conductors, baggagemen and brakemen, the increases varying from 16 to 25 per cent.

A porter of the Wagner sleeping car line between Suspension Bridge and New York, over the West Shore, has been arrested for smuggling 50 cans of opium from Canada.

The corporation of St. John, N. B., has about decided to build a grain elevator, President Van Horne, of the Canadian Pacific, having offered \$40,000 aid on behalf of the railroad company.

George Sontag, the California train robber, was tried and convicted at Fresno, Oct. 30. The Missouri Pacific has given \$1,000 to the families of the Coffeyville (Kan.) men who killed the train robbers there.

Theodore Morgan, arrested recently for burning five

barns, wrecking two railroad trains, and attempting to wreck others by placing obstructions on the track at Kokomo, Ind., has been declared insane. He is nineteen years old.

The Atchison, Topeka & Santa Fé has concluded negotiations with its complaining telegraph operators. The settlement is said to be regarded as satisfactory by the committee representing the operators. The company grants an increase of \$15,000 in salaries, besides agreeing to pay overtime.

The south-bound express train on the East Tennessee, Virginia & Georgia was stopped near Piedmont, Ala., on the night of Oct. 31 by two masked men who compelled the messenger to deliver to them \$705. They then went into the mail car and got a lot of valuable packages. The whole work was done in three minutes.

A newspaper item states that the lunch counters at stations on the Chesapeake & Ohio have been improved in character and increased in number. This, we are told, is due to the recognition, by President Ingalls, of the fact that a man traveling with a wife and three or four children cannot afford to patronize a dining car.

The lack of rain is causing much inconvenience in many places in the New England and Middle states. The Pennsylvania railroad has been obliged to supply its tanks at Wall and at Gallitzin, on the Pittsburgh division, by hauling water in tank cars about 10 miles. Temporary pumping engines have had to be put in at several other places.

A decision has been rendered by Judge Gillett at Valparaiso, Ind., in the case of the Louisville, New Albany & Chicago to determine the validity of the Indiana tax law as applied to railroads. It affirms the constitutionality of the enactment of the legislature of 1892 and establishes the liability of the railroad company for the payment of all assessments made in accordance with its provisions. The suit was one in which the railroad was resisting the collection of taxes in 65 counties. The case will go to the Supreme Court.

The Intercontinental Railroad.

It will be remembered that three parties of surveyors were sent out by the Intercontinental Railway Commission to conduct surveys in Central and South America. Corps No. 1 to Central America, under Lieut. M. M. Macomb, U. S. Army; corps No. 2, to Ecuador and Colombia, under Mr. William F. Shunk, and corps No. 3 to Ecuador and Peru, under Mr. J. Imbrie Miller. Corps No. 1 has finished the survey in Guatemala and is now engaged on that through Salvador and is expected to reach Costa Rica this winter or next spring. Corps No. 2 has run an instrumental line from Quito to Cartagena, Colombia, and at latest accounts were about to commence operations in the neighborhood of San Jose de Costa Rica, and work south to and through the Isthmus of Panama to make connection with the northern terminus of their Colombian line in the basin of the Atrato. Corps No. 3, since last November under the charge of Mr. W. D. Kelley, Mr. Miller having been invalided home, has surveyed a line from Quito to Cusco and connected with the existing railroad running from near the latter point to Puno, on Lake Titicaca. The members of this corps have returned to the United States, and are engaged in working up the field notes and maps.

Street Railroad Projects.

The Valley Passenger Railway Co., which proposes to construct a line from Archibald Borough to Scranton, thence to Pittston and Hughestown, Pa., a distance of 26 miles, was incorporated at Harrisburg last week with a capital stock of \$200,000. The directors are August Robinson, John J. Fahey, Joseph O'Brien, M. W. Collins, George M. Halstead.

The project of extending the electric road connecting Punxsutawney, Pa., with Clayville, Pa., to Indiana, Pa., a distance of 30 miles, is now being seriously considered.

The Chicago & South Side in the Columbus Week.

Under date of Oct. 25, 1892, Dr. W. F. Barnard, General Manager Chicago & South Side Rapid Transit Railroad, issued the following general order: The General Manager tenders his congratulations to the officers and employes of the company, and particularly to those of the operating department, for the successful and very satisfactory manner in which the transportation of passengers on the Chicago & South Side Rapid Transit Railroad was conducted during the World's Fair dedication ceremonies, just closed, under conditions that strained and overtaxed the capacity of the oldest and best equipped suburban roads in Chicago. With but 5.9 miles of its line in operation, with only one-third of the equipment that will be provided for the World's Fair traffic, and with temporary terminal facilities at both ends, the "Alley L." road handled an unexpectedly large traffic without mishap, delay or serious inconvenience to passengers. The fact that, since the opening of the road, on June 6, not one person out of the millions transported has been injured, shows a commendable observance of rules 224-5, which require that "The safety of passengers shall always be of the first consideration with employes," and that "In all cases of uncertainty they must take the safe course, and run no risk." In expressing his warm personal thanks to each officer and employe who, by his energy and devotion contributed to this result, the General Manager has pleasure in announcing, that in recognition of their services, a day's pay will be added on the October pay roll to the time of each officer and employe of the operating department.

The Ismid-Angora Railroad.

The Ismid-Angora Railroad in Asia Minor is referred to by the Austrian *Eisenbahn Zeitung* as especially noteworthy because of the dearth of timber in the districts through which it passes, and in consequence of which iron has been used exclusively in laying down the permanent way. Not only the cross ties, but the bridge floorings, telegraph poles along the line, etc., are of iron. The road forms a continuation of the railroad from Scutari to Ismid, which has been in operation for several years past, and will, it is thought, be ready for traffic by the end of the year. It will be 490 kilometres (about 310 miles) long, and will have a single standard-gauge track, though the necessary land for another track has been secured.

Transatlantic Steamer Traffic.

A meeting was held at Cologne on the 28th of October of representatives of the North German Lloyd, Hamburg-American, Netherlands-American, and Red Star Steamship companies. It was agreed to work the east-bound steamer traffic on the pool system, the same as the existing system governing the west-bound steamer traffic. Measures were also adopted that will facilitate travel to Chicago during the World's Fair, but the representatives of the companies are not yet willing to make public the passenger rates they agreed upon.

Burn 'em.

"Burnham! Burnham!" called the brakeman on the Maine Central train in that village one day last week. "Don't leave your umbrellas or packages in the car!" "Well," said one lady, "I shan't burn my umbrella. I brought it clear from Lowell."—*Leviston Journal*.

Elizabeth & Plainfield Electric Railroad.

Articles of incorporation have been recently filed for an electric road to extend from Elizabeth to Plainfield, N. J. The line will start at the Union crossing in Elizabeth and will parallel the line of the Central Railroad of New Jersey to Plainfield, about 12 miles. The road will be first built as far as Westfield, about seven miles. The power for operating the road by electricity will be obtained from the new central station at Elizabeth. The capital stock of the company is \$100,000, and the promoters are men largely interested in the development of the country through which the new line will extend.

A Railroad up Popocatepetl.

Mr. Mauricio Rahden, formerly Consul of Mexico at Kansas City, has secured an option on the volcano of Popocatepetl. It is contemplated to build an electric railroad up the volcano, connecting a few miles from the base with the Inter-oceanic Railroad. The electric railroad will be utilized for bringing down the sulphur and also the natural ice for the supply of the City of Mexico, which should be in itself a remunerative business. The quality of Popocatepetl sulphur is excellent, and, if mined in large quantities, would find a ready market in the United States. The sulphur of the volcano was utilized by Cortez for making powder for his troops. Baron von Humboldt says: "Speaking at the same time of the tin of Tasco, which was used in founding the first cannon, Cortez remarks that he is in no want of sulphur for the manufacture of powder because a Spaniard drew some from a mountain that is perpetually smoking, by going down tied to a rope to the depth of from seventy to eighty fathoms."—*Mexican Financier*.

German Vestibule Trains.

Concerning the much talked-of vestibule trains, now running between Berlin and Cologne, Germany, and to which reference has already been made in the *Railroad Gazette*, the following additional particulars are given in the German papers: Each train is made up of six new cars, having four axles each. One of these cars is a combined mail and baggage car; four of them have each two first-class and four second-class compartments; and the remaining car has five second-class compartments and a porter's compartment. The mail and baggage car is coupled on immediately behind the engine, and is followed by the car with the five second-class compartments. The mail and baggage car is 56.7 ft. long, and the other cars measure 52.85 ft., the weight of the cars ranging between 29,000 and 29,300 kg. (63,800 and 64,900 lbs.), each. The cars have side aisles, one meter (3.28 ft.) wide, and covered connecting platforms, so that one can readily pass from one end of a train to the other. Each first-class compartment has four numbered chairs, while each second-class compartment has six numbered seats arranged in the manner usual on German roads. The first-class compartments also have each a movable table, and bracket tables hung under the window sills. All the tables are covered with green cloth.

The porter's compartment is fitted up with cooking utensils, closets for supplies, etc., a refrigerator, tables, and other necessities. Gas stoves are used for cooking. Each car has also a water closet and lavatory. Soap and towels can be obtained from the porter for a small consideration. The aisles and small ante rooms contain collapsible chairs. Bottles containing drinking water, and glasses are conveniently disposed. The cars are heated by steam and lighted by gas, and have electric call bells for the convenience of the passengers. Food of good quality and in some variety can be obtained from the porter at moderate prices. Extra seat tickets must be secured by the passengers in addition to the regular trip tickets, the extra charge being one mark about 25 cents. These seat tickets can be obtained in advance only at the two terminals, Berlin and Cologne. The advance sale of these tickets is closed half an hour before the starting time.

A Mt. Blanc Observatory.

A second attempt to erect an observatory on the summit of Mt. Blanc is spoken of in the *Zeitschrift* of the Austrian Engineers' and Architects' Society. As may be remembered the experimental tunnel driven through the snow on Mt. Blanc last year showed an absence of anything substantial on which to rest a foundation. It is now proposed, however, to build the observatory directly on the frozen snow. In order to determine whether a superimposed weight would cause any movement of the snow foundation a small, wooden building was erected on the proposed observatory site late in the summer of 1891.

Examination last January, as well as in the early spring of this year, failed to show the slightest movement nor any damage to the building, and work is, therefore, now being pushed on the observatory. The latter is to be of wood, measuring about 17 x 26 ft., two stories high, the building to be on six heavy wooden piles, with screw jack arrangements, so that in case there should be any movement of the snow the level may be adjusted. The whole building is to be completed at Paris and is to be carried to its destination in sections.

The Coal Trade in New England.

Census bulletin No. 28 gives the consumption of anthracite in the New England States in 1889 as 5,400,000 tons of 2,240 lbs. The tons of bituminous coal did not vary materially from the same amount. The hard coal sold annually in New England has not varied much in amount for a number of years, the domestic use increasing and about balancing the decrease in the use of anthracite in factories. Still, hard coal is yet supplied to manufacturers, the percentage so used being estimated at one-third or one-half of the total hard coal carried. This fact is enough to show that the quantity of New England anthracite cannot be increased except by a marked reduction in price or in transportation charges. Nor can the price of railroad charge be advanced, for hard coal is now barely holding its own with bituminous. A comparatively small arbitrary advance would throw

the larger portion of factory trade over to the soft coal mines. A simultaneous advance in all coal is hardly possible. Norfolk soft coal is carried 400 miles to tide-water and sold in New England for less than \$4 per ton, the water transportation from Hampton Roads to Boston being about \$1.40 per ton, including discharging. The *Coal Trade Journal* records charters for coal boats to Boston from New York as low as 40 cents per ton, and 50 cents per ton from Philadelphia and Baltimore. Though these were exceptionally low prices, yet it is manifest that the rail charges on hard or soft coal via the Poughkeepsie Bridge are limited by a very strong water competition to the New England ports on the sound and ocean. The situation becomes clearer when we recollect that all the large manufacturing cities of New England are within 40 miles or so of tidewater. Worcester, Lawrence, Lowell, Fall River, Taunton, are all within easy reach of water coal; even the interior city of Manchester, N. H., is but 37 miles from Boston (and but 41 miles from tidewater at Portsmouth). If the rail coal traffic into New England is to be increased, it must be carried at such low rates as under present conditions would compel a loss rather than a transportation profit. The traffic now carried by the Poughkeepsie route is taxing the facilities of the connecting roads. No great increase in coal or other traffic could be carried over these single-track roads without a large expenditure—running into the millions—for terminals, side tracks and equipment. If the money were appropriated and the traffic secured at the low rates necessary, it is yet a debatable question whether the increased expense would be justified.—*Evening Post* (New York).

An Immense Coal Breaker.

The Lehigh & Wilkesbarre Coal Co. has broken ground for the largest coal breaker in this or any other country at Ashley, Pa., near Wilkesbarre. The shaft, like the breaker, is said to be the largest in the world. It is 13 ft. by 54 ft. and four carriages will be used to hoist coal from the two immense veins—the Baltimore at 640 ft. and the Red Ash at 940 ft. The shaft will also contain a pumpway and an airway. The breaker itself will measure 127 ft. by 150 ft. and will have a capacity of 3,000 tons a day. The works will cost about \$250,000 before any coal can be shipped, but when they are opened, employment will be furnished to about 2,000 men and boys, or 1,000 more than are at present at work in the mines about Ashley, known as Jersey No. 8, which will be abandoned and flooded upon the completion of the new works.

Adams Express on the Burlington.

The Chicago, Burlington & Quincy has made a contract with the Adams Express Co. by which the latter will occupy all the lines in the C. B. & Q. system on and after Jan. 1 next. The Burlington lines have been operated heretofore by the American Express east of the Missouri River and Wells-Fargo west of the Missouri. Both of these companies also do the express business on certain competing lines. It is said that the Burlington Company has had in contemplation the idea of running its own express, as is now done by the Great Northern, Northern Pacific, and some other large roads, but this announcement indicates that this has been abandoned.

Great Northern Improvements at Minneapolis.

The Great Northern has awarded the contracts for grading, building retaining walls and filling approaches for its East side track lowering at Minneapolis. There were six tenders for the work, and the successful bidders were Winston Brothers, Minneapolis, grading, and Ring & Tobin, also of Minneapolis, masonry. Plans for the highway bridges are now being prepared, and the contracts will be let soon, as the work is to be completed by June 20, 1893. The estimated cost of the entire work, including bridges, is \$350,000.

Fatal Collision at Thirk, Eng.

A press dispatch of Nov. 2 reports a rear collision early on the morning of that day at Thirk on the North-eastern, near York, by which nine persons were killed and many injured. It appears that the night express train from Edinburgh to London ran into the rear of a freight train during a dense fog. No particulars are given except that the passenger carriages caught fire and were destroyed. The assistance of the residents near by saved a number of persons from being burned to death.

On the same day it was reported that a collision on the Mersey Railroad, near Liverpool, caused the injury of a large number of passengers, of whom three were killed.

LOCOMOTIVE BUILDING.

The Baltimore & Ohio is about to let contracts for 50 engines, 15 of which will be for passenger service.

The Pennsylvania Railroad has contracted for 45 consolidation engines class "R" with the Baldwin Locomotive Works. The Philadelphia & Reading has given an order to the same firm for 50 engines, one-half of which will be compounds with Wooten boilers. Among other orders recently received by the Baldwin Works for compound locomotives are the following: Central of Georgia, two eight-wheel passenger and two freight; Cincinnati, New Orleans & Texas Pacific, one 10-wheel passenger engine; Missouri, Kansas & Texas, one compound consolidation; Delaware, Lackawanna & Western, 10-wheel compound; Marietta & North Georgia, one compound; and Jacksonville, Tampa & Key West, one passenger compound. The Manitowish & Pike's Peak has sent its three simple engines to be compounded. The Richmond & Danville has ordered one 10-wheel passenger engine.

The Baldwin Locomotive Works are also delivering to the Lehigh Valley division of the Philadelphia & Reading 10 consolidation compound engines.

BRIDGE BUILDING.

Boonville, N. Y.—The Owego Bridge Co., has completed the new iron bridge, 150 ft. long, over the Black River, near Boonville.

Cambridge, Md.—Seven bids for building the superstructure of the bridge over Cambridge Creek were opened by the County Commissioners. The proposals were examined by Engineer Charles H. Latrobe, of Baltimore. The lowest bid, \$5,120, was made by the King Bridge Co., of Cleveland, O.

Clinton County, Pa.—A charter was granted to the Round Island Bridge Co., of Clinton County, in Pennsylvania, last week. Capital, \$2,500.

Edmonton, N. W. T.—Government engineers are making surveys for a bridge to be built across the Saskatchewan River at this town.

Florence, Ala.—The bridge being built over the Tennessee River at Florence, Ala., for the Memphis & Charleston, consists of 13 deck spans, as follows: One span 154 ft. long c. to c. end pins; 6 spans 115 ft. 6 in., 4 spans 116 ft. 7½ in., 1 span 114 ft., and 1 span 119 ft. 6 in.

All of the spans are of the triangular type and are 19 ft. 9 in. deep c. to c. chord pins. The 154-ft. span has eight angles; the other spans have six. The trusses are placed 15 ft. 6 in. apart c. to c.

The railroad track is carried by two lines of stringers spaced 9 ft. apart resting on top of floor beams. The top flanges of the stringers and the top of the top chord are in the same plane, it being intended to use the top chords as safety stringers. The cross ties are 8 in. x 10 in. x 18 ft. spaced 16 in. apart c. to c. Besides the railroad the structure carries a 14-ft. roadway upon floor beams suspended from the bottom chord pins. The bridge is to be built of medium steel and is designed to carry beside the dead load a live load of two 92-ton consolidation engines followed by 3,400 lbs. per lin. ft. on the railroad and a moving load of 1,300 lbs. per lin. ft. on the highway. The Detroit Bridge & Iron Works are the contractors building the bridge.

Harrisburg, Pa.—The Allegheny & Esplen Bridge Co. was chartered at Harrisburg last week; the capital being \$12,000.

Helena, Mont.—The County Commissioners have awarded the contracts for building new bridges to replace those washed out last summer during the heavy storms. The San Francisco Bridge Co. was given the contract to put in two bridges, one near Dearborn for \$2,800, and one near Kisselburghs, for \$1,447, and John Duffy the contract for two bridges.

Kingston, Ont.—A movement is on foot to have Cataragui bridge removed and a new bridge built at Belle's Island, connecting Barriefield with the mainland.

Montreal.—It is announced that work will be commenced before winter on the new Wellington bridge across the canal. The estimated cost of the work is \$175,000. Tenders will be called for this month. The specifications will provide for two sidewalks occupying, with the wagonway, 46 ft., to be supported by a stone pier at least 48 ft. wide. Mr. Kennedy will be Government overseer of the construction.

New Brunswick, N. J.—The fourth span of the new stone arch bridge over the Raritan River at Albany street settled on last week. The stone work of the fourth pier on the east side of the arch is cracked, and the mason work will have to be removed.

New York, Lake Erie & Western.—The following contracts for important bridge work have recently been let:

To the Union Bridge Co., a double track iron viaduct to replace the pile trestle about 2,000 ft. long, across the Hackensack River, near Jersey City, consisting of heavy transverse girders resting upon Z-bar columns and supporting longitudinal stringers, and weighing roughly a thousand tons. The drawbridge is a substantial double-track structure and this viaduct is for the approaches. The contract for the substructure, consisting of piling and creosoted timber at "wind and water," is placed with Coffrode & Evans. Repairs to the Tippecanoe bridge, Chicago & Erie Division, No. 305, covering iron weighing 100 tons; also the following deck plate girder bridges: No. 44, consisting of two spans, 18 ft. 3 in. and 21 ft., with column bents; No. 52, similar to No. 44; No. 46, three spans, 21 ft. 9 in., No. 51, similar to No. 46; No. 49, one span 18 ft. 3 in. and one span 22 ft. 2 in.; No. 50, similar to No. 49; No. 43, one span 18 ft. and three spans 20 ft. 7 in.; No. 53, two spans 18 ft. 6 in. and one span 21 ft.; additional double-track plate girder for bridge No. 13, Delaware Division, and material for repairs to bridge No. 5. All of the above bridges, except as noted, are on the main line.

To the Elmira Bridge Co. the following deck plate girder bridges, single track, for the Chicago & Erie Division: Bridge No. 10, one span, 17 ft. 1½ in.; No. 61, one span, 25 ft. 6½ in.; No. 85, similar to No. 61; No. 104, three spans, 17 ft. 6½ in. each; Nos. 133 and 134, one span each, 17 ft. 6½ in.; No. 192, one span, 32 ft.; No. 285, one span, 42 ft., and bridges Nos. 347 and 360, one span each, 25 ft. 6½ in.; also the following through plate girder bridges: No. 44, one span, 55 ft., and one span, 77 ft.; No. 62, one span, 72 ft., and No. 62½, similar to No. 62. For the New York, Pennsylvania & Ohio Division: Six spans of I beam bridges, all 15 ft. each; No. 22, one through plate girder span, 80 ft.; No. 38, one deck span, 24 ft.; No. 62, one deck span, 45 ft.; No. 66, one through span, 30 ft., and No. 68, one deck span, 40 ft.

Pittsburgh, Pa.—President George L. Holliday, of the Common Council, will present at the next meeting of that body an ordinance to submit to the voters of Pittsburgh a proposition to issue \$2,000,000 in bonds for the purpose of buying the Point, Smithfield street and Tenth street bridges. Mr. Holliday considers such a plan the most feasible way of securing free bridges. A committee of the Council was appointed some months ago to consider the entire matter of free bridges at Pittsburgh and has considered plans for buying existing bridges and for erecting new structures, but has not agreed on a report.

Portage, N. Y.—The Western, New York & Pennsylvania will build a new iron bridge across the Genesee River at Portage, 450 ft. long and 60 ft. high at the highest part.

Portland, Me.—The pile bridge of the Grand Trunk Railroad, at Portland, Me., across Back Bay, 1,550 ft. in length, has been renewed and a steel through truss swing of two equal spans, 187 ft. over all, on a stone pivot, is in course of erection. This work has been laid out in accordance with instructions from the War Department to meet the increased facilities required at that place. The Rochester Bridge & Iron Works, Rochester, N. Y., are the contractors for the steel work, the piling and masonry being done by the Grand Trunk Co.

Shock's Mills, Pa.—The Pennsylvania is preparing to erect a new bridge at Shock's Mills.

Stellarton, N. S.—The new iron bridge at Big River, opposite Stellarton, just completed, is one of the finest structures in the province. The bridge is set on two concrete piers. On the west side there is a breakwater 75 ft. long, 9 ft. wide and 10 ft. deep, filled with stone. The bridge was built by the Dominion Bridge Co.

Wilkes Barre & Eastern.—This road, which is now building from Wilkes Barre to Stroudsburg, Pa., will require about 2,500 tons of bridges. The contracts for about 2,000 tons are already let and the remainder will be let in a few days. The principal structures are as

follows: a Susquehanna River Bridge at Wilkes Barre comprising six pin connected deck spans, five 177 ft. long each, and one 136 ft. long, and one lattice deck span 115 ft. long; the Panther Creek Viaduct composed of plate girders 30 and 60 ft. long resting on Z bar bents, with a total length of 1,700 ft. and height of 150 ft.; two crossings of the Lehigh Valley R. R., the first of two pin-connected through spans of 100 and 150 ft. each, and the second of a similar span 110 ft. long; the crossing of the Delaware & Hudson tracks, a similar span 110 ft. long, and the Michaels Creek Bridge, a similar span 150 ft. long. There are also a number of smaller plate girder spans.

Yellowstone Park.—Government work in the National Park has been suspended for the season. The new bridge at the Upper Falls, a structure 190 ft. in length, is well under way, but will not be completed before next year.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Illinois two or more railroad companies, whose roads form a continuous line, may enter into a joint arrangement for operating the roads as one line, and become jointly liable for money borrowed to be used in furtherance of the business of such line.¹

The Supreme Court of the United States holds that a court of equity can appoint receivers for an insolvent railroad company, on the application of the company itself, by a petition showing that its property is likely to be seized by different courts, its assets dissipated and the system disrupted; but cannot displace vested liens and must require that the property shall be held and preserved by the receivers for the benefit of all concerned therein as their interests may appear.²

A Michigan statute provides that "it shall be lawful for any railroad company in this state, which shall have entered in good faith upon the work of constructing its road, and shall become unable to complete the construction of the same, or any part thereof, to sell or convey the whole or any part of its road so partially completed, together with the rights and franchises connected therewith, to any other railroad company or corporation of this state, not having the same terminal points, and not being a competing line." The Supreme Court rules that this statute authorized a railroad company to purchase the stock of another company for the purpose of acquiring its roadbed and right of way.³

In a case in the Federal Court under the provision of a contract for railroad grading, excavations were to be measured and paid for either as earth, loose rock or solid rock; loose rock to comprise "shale or sandstone lying in its original or stratified position, coarse boulders in gravel, cemented gravel, hardpan, or any other material requiring the use of pick and bar, or which cannot be plowed with a strong 10-in. grading plow, well handled, behind a good six mule or horse team." The court rules that the materials mentioned were to be classified as loose rock, irrespective of the plowing test, which was only applicable to the "other material," not specifically named.⁴

In the same case it appeared that the material in all cuts, except rock cuts, varied much in consistency and hardness, and lay in irregular strata, and that the largest part of it was broken up by the plow. It is held that the practice of the engineer in estimating loose rock by percentages was justifiable in the circumstances. The Court lays it down that a provision in a contract for railroad grading that the measurements and calculations by the railroad company's chief engineer of the quantity and amount of the several kinds of work, and his classification of the materials contained in excavations, shall be final and conclusive, is a valid provision, and is binding upon the parties to the agreement, and there can be no recovery in excess of his final estimate, in the absence of fraud, gross error or mistake. But the Court will relieve against mistakes in measurements and calculations apparent upon the face of the estimates, or clearly proved, though not so apparent, or from oversight to measure or estimate any particular part of the work, or from wrong constructions put upon the provisions of the contract by the engineer; but will not relieve against alleged mistakes in determining the kind of materials found in the several cuts, the parties being bound by the judgment of the engineer selected by them for special skill and attention as the umpire on such questions; nor will it relieve against slight discrepancies in measurements.⁵

The Supreme Court of Georgia rules that the lien given by the Code, to "contractors to build railroads," is confined to those contractors employed by the person or company owning the railroad; and the right of lien does not extend to subcontractors who procure the work to be done on their own account in pursuance of a contract between themselves and the primary contractors.⁶

Carriage of Goods and Injuries to Property.

A Texas statute provides that common carriers, entirely within the body of the state, shall not limit their common-law liability by exceptions in the bill of lading, or in any manner whatever, and no special agreement made in contravention of the provisions of the article shall be valid. The Supreme Court holds that such statute does not apply to an interstate or foreign shipment, but only to shipments beginning and ending within the state.⁷

In Colorado one or two railroad routes by which express matter might be forwarded to R. terminated at D. Goods were expressed to R. "via D." The Supreme Court rules that the word "via" did not designate a terminal point, and that the express company was liable for detaining the goods at D. without notifying the consignee at R., for, if there was no public carrier from D. to R., it was the duty of the company to carry the goods to the nearest available point, and then to notify the consignee.⁸

The Supreme Court of New York holds that in an action by a bank note engraving company to restrain the operation of an elevated railroad unless it should pay for easements taken, no damages can be recovered for injuries to plaintiff's personal property, consisting of plates, paper, processes, etc., arising from the exclusion of light and the precipitation of cinders.⁹

In Missouri the Supreme Court rules that upon the condemnation of mortgaged land, it is proper to award the mortgagor the full value of the land, since the damages awarded stand in place of the land, and can be subjected to payment of the mortgage.¹⁰

Injuries to Passengers, Employees and Strangers.

In a case in the Federal Court of Appeals, the plaintiff took passage on defendant's freight train, which, when it reached his station, halted in such a position that the caboose in which he was riding was quite a distance

from the station. He was alighting, when the brakeman told him not to get off, for, after the freight was unloaded, the train would be moved so as to bring the caboose near the platform. The train instead of slackening up as the caboose neared the platform, increased its speed, and plaintiff, acting under the advice of the brakeman, jumped off, and was injured. The Court decides that defendants were estopped by the act of their servant from claiming that plaintiff was in fault in not leaving the train when it first stopped, or that its contract of carriage was fully performed at such time; and plaintiff was entitled to recover if, in jumping off the train, he acted as a prudent man would have acted under the same circumstances.¹¹

In Indiana, a baggage master on a railroad train is considered a co-servant with the conductor of another train, through whose negligence a collision occurs.¹²

In Missouri, a laborer working in a railroad company's quarry, near its main tracks, under direction of a foreman having no connection with the train service, is not a fellow-servant of employees operating a passenger train on the line.¹³

In Missouri a conductor of a material train, having control of it and its movements, and a foreman over a gang of men engaged in repairing a railroad track, having power to direct them what to do and when to do it, are not fellow-servants of the men composing such gang.¹⁴

In West Virginia, where a conductor, in charge of a train, with a right to command and to control its movements, or a yardmaster who is so in charge as conductor, leaves the train standing on the main line, along which a train, due, and expected by him, has a right to pass, and fails to use ordinary care to notify in any way the expected train of such obstruction in its way, as required by the rules of the company, and a collision takes place, resulting in the injury of a brakeman on the coming train, the brakeman is not the fellow-servant of the conductor.¹⁵

In New York the Superior Court rules that where the determination of the sufficiency of appliances for holding defendant's railroad train in descending a grade was left to its conductor, the decision of the conductor was the decision of defendant; and defendant was liable for the death of a brakeman on the train, caused by the insufficiency of the appliances used.¹⁶

In Missouri, in an action by a fireman, it appeared that a freight car, without sufficient brakes to hold it, was left standing on a side track, and during the night, by reason of the wind or of its own weight, it moved down on the main track, where plaintiff's locomotive collided with it, causing the injuries complained of. The Supreme Court rules that the accident was not the result of the negligence of plaintiff's fellow-servants, who left the car on the side track, but was caused by negligence of defendant company in not providing sufficient brakes to hold the car on the side track, where placed.¹⁷

In Texas as plaintiff approached a highway crossing, defendant's engine came down the track, and stopped partly on the crossing; in attempting to cross the track in front of the engine, plaintiff's horse became frightened and ran away, and threw plaintiff out of the wagon, slightly injuring him. The Supreme Court holds that plaintiff was guilty of contributory negligence, and could not recover.¹⁸

In West Virginia the Supreme Court rules that one who, without an invitation, visits, for the purpose of paying a friendly call on the operator, a telegraph office owned and occupied by a railroad company for its own purposes and convenience, and which is located on its land and near its track, though occasional messages are sent therefrom and received thereat for outside parties for pay, visits the office as a mere licensee, and the company is under no duty to keep the premises in safe and suitable condition for him, and it is only liable for such willful or wanton injury to him as may be caused by the gross negligence of its agents or employees.¹⁹

The Federal Court holds that where a woman is riding on the back seat of a two-seated spring wagon, which is driven by her brother, who owns the team and wagon, and over which she has no control, and she is injured in a collision at a crossing by a train, if the negligence of the brother in driving upon the crossing contributes to said injury, such negligence cannot, as a matter of law, be imputed to her.²⁰

In Minnesota in an action for the death of a child 12 years old, there was evidence that, while defendant's servants were switching freight cars, deceased, who was playing near by, and one of the brakemen on the cars, while the cars were standing still, threw snowballs at each other, and, while the brakeman was still looking at her, deceased asked him if she could have a ride, to which he made no reply; that she then said to her little companions, loud enough for him to hear, "Come on, let us take a ride," and then went to the car, and climbed part of the way up the ladder on the side of it. The train had not moved, and the engineer was waiting for the signal, which this brakeman was to give. The train moved forward a little, and deceased was killed. The Supreme Court holds that, though deceased was a trespasser, there was evidence from which it might be found that defendant's employees knew of her danger, and did not use reasonable care to prevent the accident, and it was error not to submit the question to the jury.²¹

¹ C. P. & St. L. Ry. Co. v. Ayres (Ill. Sup.), 30 N. E. Rep. 687.

² Quincy, M. & P. R. Co. v. Humphreys, 12 S. Ct. 787.

³ Dewey v. T. A. A. & N. M. Ry. Co., 51 N. W. Rep. 1063.

⁴ Lewis v. C. S. F. & C. Ry. Co., 49 Fed. Rep. 708.

⁵ Lewis v. C. S. F. & C. Ry. Co., 49 Fed. Rep. 708.

⁶ Carter v. Home & C. Const. Co., 15 S. E. Rep. 56.

⁷ M. P. Ry. Co. v. Sherwood, 19 S. W. Rep. 454.

⁸ D. & R. G. R. Co. v. De Witt, 29 Pac. Rep. 524.

⁹ Am. Bank-note Co. v. Met. El. Ry. Co., 18 N. Y. S., 532.

¹⁰ Thompson v. C. S. F. & C. Ry. Co., 19 S. W. Rep. 77.

¹¹ Owen v. R. R. Co., 40 Fed. Rep. 602.

¹² Kerlin v. Chicago, P. & St. L. R. Co., 50 Fed. Rep. 185.

¹³ Dixon v. Chicago & A. R. Co., 19 S. W. Rep. 412.

¹⁴ Miller v. Missouri Pac. Ry. Co., 19 S. W. Rep. 58.

¹⁵ Daniel v. C. & O. Ry. Co., 15 S. E. Rep. 162.

¹⁶ Wooden v. W. N. Y. & P. R. Co., 18 N. Y. S., 768.

¹⁷ Henry v. Wabash W. R. Co., 19 S. W. Rep. 237.

¹⁸ Ft. Worth & D. C. Ry. Co. v. Tallaferrero, 19 S. W. Rep. 432.

¹⁹ Woolwine's Adm'r v. C. & O. R. Co., 15 S. E. Rep. 81.

²⁰ Lapey v. Union Pac. R. Co., 50 Fed. Rep. 172.

²¹ Hefpel v. St. Paul, M. & M. Ry. Co., 51 N. W. Rep., 1,049.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Old Colony, quarterly, 1½ per cent., payable Dec. 1.
Pennsylvania, semi-annual, 3 per cent.
Rome, Watertown & Ogdensburg, quarterly, 1¼ per cent., on the common stock, payable Nov. 15.
Toledo & Ohio Central, quarterly, 1 per cent., on the common stock, payable Nov. 25.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Alabama & Vicksburg, annual, Jackson, Miss., Nov. 7.
Baltimore & Ohio, annual, Baltimore, Md., Nov. 21.
Buffalo, Rochester & Pittsburgh, annual, New York City, Nov. 21.
Chicago, Indianapolis & Chattanooga, annual, Indianapolis, Ind., Nov. 15.
East Tennessee, Virginia & Georgia, annual, Knoxville, Tenn., Nov. 16.
Manhattan, annual, New York City, Nov. 9.
New York, Lake Erie & Western, annual, New York City, Nov. 29.
New York & New England, special, Boston, Mass., Nov. 21, to approve the lease of the Providence & Springfield.
New York & Northern, annual, New York City, Nov. 9.
Philadelphia, Newton & New York, special, Norristown, Pa., Nov. 23, to consider an increase of bonds to \$1,600,000.
Toledo, St. Louis & Kansas City, special, Toledo, O., Nov. 14, to consider an increase of bonds to \$13,500,000.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its next annual meeting at Lookout Mountain Hotel, Chattanooga, Tenn., beginning Nov. 15, having been postponed from Oct. 18.
The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.
The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.
The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.
The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.
The *Northwestern Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.
The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.
The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.
The *Boston Society of Civil Engineers* holds its regular meetings at Wesleyan Hall, Bromfield street, Boston, at 7:30 p. m., on the third Wednesday in each month.
The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.
The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.
The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January.
The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.
The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.
The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.
The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.
The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.
The *Denver Society of Civil Engineers and Architects* holds regular meetings at 35 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.
The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.
The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.
The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.
The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.
The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.
The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.
The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.
The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.
The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.
The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.
The *Engineers' and Architect Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

American Society of Civil Engineers.

At the meeting held Nov. 2 a paper was read on "Electric Rock Blasting—the American Method," by William L. Saunders, M. Am. Soc. C. E. This paper is a condensation of matter given at various times elsewhere, together with new information such as to make a complete presentation of the subject. The author shows the importance of simultaneous discharge of blasts, and the impracticability of such by the old methods. The form of battery and exploder used are described and the dangers from small exploders noted. A large exploder will fire even a frozen cartridge. The distribution of exploders so as to cause a high initial explosion is discussed; also methods of use. The best place for an exploder is fully treated upon; also the dimension, position and direction of holes, and the manufacture of the exploders. Conducting wires and modes of connecting and handling them are considered. The writer does not believe in so-called blast testers, and gives his reasons, together with causes of failure in blasts. The various electric blasting machines and methods, difficulties and dangers in their use, methods of tamping, precautions adopted, limits of safety, switches, electrical resistances to govern the strength of the current are all fully described. The cost of several large pieces of work is then given, together with a discussion of the best methods of disposing of the material. Fifteen cuts illustrate the paper.

The Secretary reminds members that the library of the Society is a reference library, and should contain the published reports of every engineering work in the land. Copies of such reports should be sent to the library. The value of some of the earlier papers and reports now in the library is very great, and inquiries are frequently made for them. As time passes those of the present time will likewise increase in value. In some cases the sets in the library are not complete, and members may be able to aid in supplying deficiencies. It is hoped that every member will put the Society library down on his list for distribution of reports, and will also give notice of important reports, not his own, which may be obtained for the asking.

At the meeting of Nov. 2 the following were elected: **Members.**—William Walter Carson, Professor of Civil Engineering, University of Tennessee, Knoxville, Tenn.; Horace Harding, U. S. Assistant Engineer for plans and construction of locks and dams, Black Warrior River, Tuscaloosa, Ala.; Benjamin S. Wathen, Resident Engineer Texas & Pacific Railway, Dallas, Tex.

Associate.—John Henry Kinealy, Professor Mechanical Engineering, Washington University, St. Louis, Mo.

Boston Society of Civil Engineers.

At the meeting of the Boston Society of Civil Engineers to be held on Wednesday, Nov. 16, Mr. E. K. Turner, late Chief Engineer of the Fitchburg Railroad, will read a paper entitled, "Notes on English Railways."

Engineers' Club of Philadelphia.

A business meeting of the club will be held on Saturday, Nov. 5, 1892, at 8 o'clock p. m. A paper on the water supply of Philadelphia, by Harry Leffman, M. D., will be read. At the regular meeting on Oct. 15, President James Christie in the chair, 26 members and visitors were present.

Mr. John C. Trautwine, Jr., presented notes on the "Distribution of Pressure in Masonry Joints," illustrated with sketches on the blackboard, showing that the true significance of the "middle third" of the joint, and the "tension" which is said to occur when that limit is exceeded, lies in the fact that masonry joints are practically incapable of resisting tension, so that when in such a joint the resultant of all the pressures falls outside the middle third, the portion of the joint which, if capable of tension, would be called upon to exert it, is simply idle, and the entire pressure is concentrated upon the remainder of the joint, the width of which is three times the distance from the resultant to the nearest edge. Owing to this the maximum unit pressure in such joints increases very rapidly after the middle third is exceeded; whereas, in a surface capable of resisting tension (such as a cross section of an iron bar) the maximum unit pressure increases uniformly, however from the centre of the section the resultant may fall.

STRENGTH OF GEAR TEETH.

Mr. Wilfred Lewis gave an account of his "Investigation of the Strength of Gear Teeth," beginning with a reference to the elementary character of the problem and the great diversity of rules adopted by many recognized authorities, and showing that although the form of a tooth had long been known to be an important factor in the determination of its strength, none of the rules in common use took account of the strength as affected by the number of teeth in the wheel or pinion.

It was admitted that some diversity of opinion might reasonably exist in regard to the distribution of pressure across the teeth and the number of teeth in action; but it was argued that so long as imperfections in spacing and shaping existed, as they still do to a very appreciable amount in the highest class of machinery, the only safe assumption was that the whole load was carried at the end of a single tooth.

On this basis a graphical solution of the problem was presented for each step in a series of 24 equidistant cuts, and tables were distributed showing the results obtained by the graphical method. These tables indicate the relative strength of wheels and pinions with reference to their number of teeth, and leave the working strength of the material to the judgment of the engineer. Two systems of interchangeable gearing were considered, the cycloidal system in common use, and the 20-deg. involute form adopted by Wm. Sellers & Co., Incorporated. A table for the strength of bevel gears with radial flanks and involute gears as cut by the Bilgram process was also presented. There was considerable discussion on this subject.

The meeting then adjourned to lunch.

Engineers' Club of St. Louis.

The Club met at 8 p. m. at the club rooms Oct. 19, President Johnson in the chair and 22 members and three visitors present.

The by-laws were amended by inserting in Section 7, in the sixth line, on page 15, after "election," "except as provided for in Section 8," and by the insertion of a new section as follows:

SECTION 8. Exchange of Members.—Any member of any other society in the Association of Engineering Societies, in good standing, may become a member of this club, when duly elected as described in Section 7, without paying the initiation fee, and with a release from the annual dues for such period, not over one year, as he may show by certificate he has paid in advance in the society from which he comes; provided such society shall have conferred like privileges on members of this Club.

Mr. W. H. Bryan then read the paper of the evening on "Steam Engine Efficiency: Its Possibilities and Lim-

itations." Mr. Bryan called attention to the popular idea of steam engine efficiency, alluding briefly to failures which had occurred in attempting to secure expected results from high efficiency machinery. He dwelt upon the ideal engine as distinguished from the real engine met with in every-day service, and showed that the perfect engine itself is of low efficiency on account of the narrow limits of temperature within which it is possible to work. The real engine is subject to still greater losses. The advantages of the multiple cylinder engine were shown, and a table, giving the results of a large number of tests of existing engines, was presented. Discussion followed by Messrs. Olshausen, Sedon, Laird, Johnson, Perkins and Schlosser.

For the next meeting, Nov. 2, a paper on "The Recent Survey of St. Louis: Its Methods and Results," by Mr. B. H. Colby, was announced.

National Association of Car Service Managers.

This organization held its annual meeting at Milwaukee, Oct. 25. The President of the Association is F. E. Morse, of New York City, and the Secretary is A. G. Thomason, Scranton, Pa.

New York Railroad Club.

The regular monthly meeting of the New York Railroad Club was held on the evening of Oct. 20 at the rooms of the American Society of Mechanical Engineers. There were no papers announced, but several topics had been selected by the Executive Committee for discussion. The talk of the evening was opened by Mr. W. G. Berg, Principal Assistant Engineer Lehigh Valley Railroad, on the subject of "The Best Plan for Railroad Shops, Rectangular or Radial." Mr. Berg spoke at considerable length and was followed by Mr. Forney who described in some detail with blackboard sketches a plan of shops that he had recently recommended in which the several buildings were grouped around and commanded by a central turntable.

Another topic discussed was "Locomotive Driving-Wheel Boxes," with special reference to the best way of lining them up to reduce lateral play.

The next meeting will be the annual election and will be held Nov. 17 at 7:30 p. m., at 12 West Thirty-first street, the rooms of the American Society of Mechanical Engineers.

Order of Railway Conductors.

The 25th annual convention of this association met in San Antonio, Tex., Oct. 26. W. R. Beckley was re-elected President. The next meeting will be held in Detroit.

Order of Train Dispatchers.

This is the name of an organization formed at Memphis last week by some train dispatchers who seem to have seceded from the Train Dispatchers' Association of America. The reports state that 132 members are already enrolled. The head of the organization is W. W. Olcott, of Pine Bluff, Ark., who appears as Vice-President in the last list of officers of the old Association. The Secretary is O. L. Embay, of Little Rock, Ark. The residences of the various other officers seem to indicate that the membership extends over a large extent of country. It is said that the prominent feature of the new organization is a protective provision; in other words, a by-law approving strikes, which was voted down at the annual meeting of the old association in New Orleans last June.

The Western Railway Club.

In place of the regular October meeting, the Western Railway Club indulged in an excursion to the World's Fair Grounds Oct. 25, on the invitation of Mr. Willard A. Smith, Chief of the Department of Transportation Exhibits. A train of four suburban cars was kindly provided by Mr. J. T. Harahan, Second Vice-President of the Illinois Central. This train left the Randolph Street station at 2 p. m., and was comfortably filled by members of the club and guests, including a large number of ladies. The train was run into the fair grounds, and the party alighted at the south end of the Mines Building, and then proceeded to inspect the grounds and buildings. About two and one-half hours were agreeably spent in this manner, and the party started on the return trip to the city about 5 p. m. The club undoubtedly stands ready to provide Mr. Smith with a first class general recommendation as a host and as a guide to the World's Columbian Exposition.

PERSONAL.

—Hon. John Haggart, Canadian Minister of Railways, has prepared memoranda to the council suggesting certain changes in the department.

—At a recent meeting of the directors of the Pintsch Compressing Co., Mr. Robert M. Dixon, who has been for many years the Engineer of the company, was elected Manager.

—Mr. A. Fteley, the Chief Engineer of the New York Aqueduct Commission, delivered a very instructive lecture on the construction of dams before the students of the Rensselaer Polytechnic Institute, on Friday, Oct. 23.

—Mr. F. H. Crane, District Superintendent of Pullman's Palace Car Co., has resigned to take the position of Superintendent of the sleeping car service of the New York, New Haven & Hartford road, which now operates its own sleeping cars.

—Deputy Minister Trudeau will be superannuated and Mr. Collingwood Schreiber appointed Deputy Minister and Chief Engineer of Railways and Canals, with a salary of \$4,000 a year as at present. A position of Assistant Chief Engineer will be created at a salary of \$3,000. Mr. Balderson, who is Mr. Haggart's private secretary, will be appointed Secretary of the Department.

—Mr. Stephen Sult, a veteran division roadmaster on the New York Central and Hudson River road, has been retired on a pension. He is now 80 years old and entered railroad service in 1833 on a coal mine road then being built. He was connected with the old Lockport & Niagara Falls road for 10 years until 1851, when he went to the new Rochester & Niagara Falls road, where he has since remained.

—Mr. Ralph Modjeski has opened an office at 218 La Salle street, Chicago. He will do a consulting civil engineering business, making special feature of bridges, viaducts and metallic structures in general. Inspection of material at mills and shops will have especial attention in his business. Mr. Modjeski has been long associated with Mr. George S. Morison in various capacities, in the role and in the field, and is a graduate of the École des Ponts et Chaussées, Paris.

—Mr. E. S. Bowen has been appointed Assistant to the President of the New York & New England, assuming the duties of Mr. Charles S. Mellen, formerly General Manager, recently appointed Vice-President and Traffic Manager of the New York, New Haven & Hartford. Mr. Bowen was for about three years General Manager of the Rome, Watertown & Ogdensburg while Mr. Parsons was President, and he was formerly connected with the Erie, and was at one time its Vice-President.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The office of W. K. Gillett, Assistant General Auditor, has been transferred from Topeka, Kan., to the Monadnock Building, Chicago. John G. Taylor has been appointed General Live Stock Agent, with headquarters at Kansas City, Mo.

The annual meeting of stockholders was held at Topeka, Kan., Oct. 27. G. C. Magoun, A. A. Manvel, Thomas Barling, B. C. Cheney, C. K. Holliday, Alden Spence, William Libbey, Robert Harris, J. J. McCook, G. R. Peck, George A. Nickerson, E. B. Purcell and L. Severy were elected directors. Robert Harris, of New York, formerly President of the Northern Pacific; George R. Peck, General Solicitor of the company, and George R. Nickerson, of Boston, were chosen directors in place of Edwin H. Abbot, Oliver W. Peabody and Warren Sawyer, all of Boston. The former officers were re-elected by the Board.

Central Massachusetts.—The annual meeting was held at the Lowell station Oct. 26, and the following board of directors elected: Samuel N. Aldrich, of Marlboro; J. Edwin Smith, of Worcester; Thomas H. Perkins, Henry Woods, Wm. T. Parker, Moses W. Richardson, and Joseph H. Gray, of Boston; Charles E. Sweet and Charles P. Darling, of Newton; W. H. Gaylord, of Northampton; Eugene N. Foss, of Boston. Jos. H. Gray succeeds Elisha S. Converse, who retires, and Eugene N. Foss is added to the board.

Central Vermont.—W. J. Robertson, previously Superintendent of Motive Power, has been appointed Master Car Builder, with office at St. Albans, Vt.

J. W. Shanks has been appointed General Roadmaster, with office at St. Albans, Vt., vice A. C. Bean, deceased.

Chambersburg & Gettysburg.—J. P. Ranney is now Secretary and Treasurer of this company with office at Philadelphia.

Chesapeake & Ohio.—George E. Sampson, Road Foreman of Engines, having been assigned to other duties, J. R. Belton has been appointed Road Foreman of Engines, Cincinnati, Lexington and Big Sandy divisions. The jurisdiction of R. W. Harris, Road Foreman of Engines, has been extended over Kanawha District, Huntington Division.

Duluth & Iron Range.—Joseph Sellwood has been made Vice-President of the road, to have charge of the Mesaba branches.

Iowa Central.—J. P. O'Brien has been appointed Assistant Superintendent of this road.

Jupiter & Lake Worth.—G. D. Ackery has been appointed General Freight and Passenger Agent of this road and the Indian River Steamboat Co., with office No. 12 Hogan street, Jacksonville, Fla.

Lake Shore & Michigan Southern.—J. A. Burch, who has for many years been Eastern and Southern Passenger Agent of the company, has been appointed General Agent, and Thomas S. Timpson, at present Eastern Passenger Agent of the Toledo, St. Louis & Kansas City, will succeed Mr. Burch as Eastern Passenger Agent of this road, both with headquarters at Cleveland, O. These changes take effect Dec. 1. Mr. Burch has been connected with the company since 1867. Mr. Timpson was formerly Eastern Freight Agent of the Cleveland, Cincinnati, Indianapolis & St. Louis.

Laurel River & Hot Springs.—The officers of this new road are as follows: James Wyman, President; Aaron F. Smith and Lewis B. Brees, Vice-Presidents; W. M. Lamkin, Secretary and Treasurer, all of Lynn, Mass., and Geo. H. King, General Manager, and H. M. Ramseur, Chief Engineer, of Hot Springs, N. C.

Louisville & Nashville.—J. Kemp Ridgley has been appointed Traveling Passenger Agent with headquarters at Louisville, Ky. J. M. Steltenkamp is appointed Florida Passenger Agent with headquarters at Jacksonville, Fla.

Michigan Central.—D. A. Waterman has been appointed Treasurer of this company, vice Henry Pratt, deceased. Office, Grand Central Station, New York. A. J. Burt has been appointed Auditor of this company, vice D. A. Waterman appointed Treasurer, with office at Detroit, Mich.

Newport News & Mississippi Valley Co.—W. J. McKee has been appointed Superintendent, with headquarters at Paducah, Ky., appointment taking effect Oct. 17, 1892, in place of W. E. Morse, resigned.

New Orleans, Fort Jackson & Grand Isle.—Frank L. Place has been appointed Auditor of this company, with office at Algiers, La.

New York, Lake Erie & Western.—M. W. Maguire has been appointed Superintendent of the Eastern Division, vice C. R. Fitch, promoted to be General Superintendent. J. F. Maguire has been appointed Superintendent of the Susquehanna Division, vice M. W. Maguire, transferred. H. E. Gilpin has been appointed Superintendent of the Western Division, vice J. F. Maguire, transferred. L. C. Smith has been appointed Superintendent of the Tioga Division, vice H. E. Gilpin, transferred.

New York & New England.—C. S. Mellen, General Manager, has resigned, to accept the position of second Vice-President and Traffic Manager of the New York, New Haven & Hartford. E. S. Bowen has been appointed Assistant to the President. All reports heretofore sent to the General Manager should now be made to the Assistant to the President.

Norfolk & Western.—S. O. Martin has been appointed Superintendent of the Radford division, vice John A. Hardy, deceased.

Charles Haldeman, of Radford, Va., is acting Superintendent on the Radford division. This position was made vacant by the death of John A. Hardy.

Northern Steamship Co.—T. P. Carpenter, who for many years was General Passenger Agent of the Lake Superior Transit Co., has been appointed General Passenger Agent of this line, with headquarters at No. 60 Main Street, Buffalo.

Owensboro, Falls of Rough & Green River.—W. R. Williams has been appointed Auditor and General Passenger Agent of this company, with office at Owensboro, Ky.

Pullman's Palace Car Co.—Frederick E. Williams, Assistant District Superintendent of the New York Division, Pennsylvania Railroad, has been appointed District Superintendent at Cleveland, O., to succeed N. C. Jamieson, resigned. Mr. Williams has been in the Pullman service for six years, filling the position of ticket agent and operator in the Pennsylvania station, Jersey City; chief clerk to Superintendent J. H. Sims, and for the past two months Assistant District Superintendent.

Reynoldsville & Falls Creek.—R. W. Macpherson has been appointed Auditor, Charles Clinton, previously Auditor, has been appointed Secretary and General Freight Agent, with headquarters at Buffalo, N. Y.

St. Louis, Chicago & St. Paul.—Charles U. Lind is now General Passenger and Ticket Agent of this company, with headquarters at 102 North Fourth street, St. Louis.

Savannah, Americus & Montgomery.—The following appointments went into effect Nov. 1: E. T. B. Glenn, appointed Train Master, with headquarters at Americus, Ga.; J. Eugene Lowry, Car Accountant, with headquarters at Americus, vice R. F. Alexander, promoted.

Victoria & Sydney.—The annual meeting of the shareholders was held last week, and the following officers elected: President, P. C. Dunlevy; Vice-President and Treasurer, M. H. Cowan; Secretary, Robert Irving. Directors, W. J. Macaulay, Julius Brethour, M. H. Cowan, P. C. Dunlevy and R. Irving.

Virginia, Tennessee & Georgia Air Line.—The office of the New York agency of the above named lines and the Cumberland Gap Dispatch has been removed to No. 317 A Broadway, corner Thomas street, New York.

Western Maryland.—John M. Hood was re-elected President of the company at the meeting of the directors last week. G. H. Baer was re-elected Secretary and Treasurer. The directors of the auxiliary lines met subsequently and elected Mr. Hood President and Chief Engineer and Mr. Baer Secretary and Treasurer of each. These lines are Western Maryland Tidewater, Western Maryland Terminal, Baltimore & Cumberland Valley and Potomac Valley.

Williamsport & North Branch.—John Marston, Jr., has been appointed Chief Engineer of Construction and Maintenance of Way, with office at La Porte, Pa. S. D. Townsend has been appointed General Auditor, with office at Hughesville, Pa.

RAILROAD CONSTRUCTION.
Incorporations, Surveys, Etc.

Atlanta Belt.—H. B. Baylor and E. B. Latham, civil engineers of Atlanta, have projected a new belt line around a portion of that city. They propose to build a line about five miles long from a point on the Georgia, Carolina & Northern to the track of the Atlanta & Florida. By the connections made with the roads now entering the city a belt line around the entire city will be practically secured. They state that the new line will be operated as an independent line.

Bangor & Aroostook.—The work is now more than half completed on the 45 miles under contract south of Houlton, Me. No track has yet been laid. The contractor for all the work is C. P. Treat, of Chicago. Work is rather lighter than average. The maximum grade running east is 1½ per cent.; running west 52 ft. a mile. The maximum degree of curvature is six, excepting three or four curves of eight degrees. There are about 30 spans of iron bridge from 60 to 150 feet in length, and about 30 from 25 to 60 ft. plate girders; one iron trestle 300 ft. in length, and about 2,000 lineal ft. of wooden trestle. Moses Burpee, of Houlton, is Chief Engineer.

Beech Creek.—The roadbed of the extension from Kerrmoor, Pa., south to Lajose, in Clearfield County, has been completed. It is 36 miles long and the rails will be laid and the road opened for business by Dec. 14. The cost of extension has been very heavy, due to the necessity for building two tunnels just above Lajose. James Kerr has a contract to continue the extension south to Kaylor, upon which work will begin at once. This road will open large tracts of bituminous coal, including 1,100 acres owned by a syndicate. Connections with the Pennsylvania Railroad are made at Lajose and traffic agreements have been made between the two roads.

Burlington, Cedar Rapids & Northern.—This company has completed this year's work in Minnesota, beginning at the end of a branch running from Troskey, Pipestone County, Minn., westerly to North Sioux Falls, and extending in a southwesterly direction to Jasper, same county, a distance of 3.77 miles. The total distance from the main line at Troskey to Jasper is 9.2 miles, 3.77 of which has been built in 1892, completed in October. Another line has been built beginning at a point on the Minneapolis & St. Louis, two miles north of Forest City, Winnebago County, Ia., and extending in a westerly direction 45 miles to Armstrong, Emmet County, Ia. The grading of this line is practically completed. The track is now laid to Buffalo Centre, in Winnebago County, a distance of 18.3 miles from M. & St. L. Junction, and will probably reach Armstrong about Dec. 15. The stations are as follows: Forest City, use M. & St. L. track to junction, 1.95 miles; Thompson, 9.3 miles, and Buffalo Centre, 18.3 miles, in Winnebago County; Germania, 26 miles; Reynolds, 36.7 miles, and Armstrong, 45.5 miles, in Kosuth County. The intention is to sometime extend this line west to a junction with the Iowa Falls division at Estherville, Ia., a distance of about 20 miles. H. F. White, of Cedar Rapids, is Chief Engineer.

Calgary & Edmonton.—The Canadian Pacific will probably take over the southern extension this week, the contractor having completed all his work some time ago. The new line is 110 miles long from Edmonton south to Fort McLeod, in Alberta, Can., making the entire length of the line from Calgary to Fort McLeod, 310 miles. The road was built by James Ross of Montreal, and is operated by the Canadian Pacific under a temporary six years' lease.

Cambria & Clearfield.—The company has just placed under contract three small branches in the vicinity of Patton, Cambria County, Pa., on the Chest Creek Division of the Cambria & Clearfield. These locations are made on the North and South branches of Little Chest Creek, which joins Chest Creek at the town

of Patton (formerly known as Marks Mills), where it furnished a water power for a small country mill. The Northern branch, upon which is situated the Ashcroft, Reilly and Lingle drifts of bituminous coal, and which heads up near the crest of the main ridge of the Allegheny Mountains in the direction of Baker's cross-roads, is known as "Dry Hollow." The length of this branch road is 2.2 miles. The Southern branch, which is the main fork, is known as Little Chest Creek, and reaches the Wigton mines and the McCormick lands. This stream heads nearly up to Carrolltown, and passes through a fine mountain farming country. It is seldom that mining enterprises are carried on under such favorable circumstances with regard to location, climate, water, timber, etc. The length of this road will be nearly three miles. Extending from the town of Patton there is a small stream known as "Flanigan's Run," which falls very rapidly from high ground. At the head of this stream is the "Peale" mine, while further north on the slopes of Chest Creek is another mine. Length of this line, 1.2 miles. The work on the above branches is quite light and is being pressed by a large force. All of these mines will be opened by these three branches and will furnish freight traffic for the Beech Creek road, the extension of which intersects the Cambria & Clearfield at Mehafter. The track from La Jose to Mehafter, connecting the Vanderbilt lines with the Cambria & Clearfield system of the Pennsylvania, is already laid and will be backfilled and surfaced complete within 10 days.

Canadian Pacific.—A newspaper dispatch states that the tracklaying has been commenced on the new branch from Renfrew west to Kganville, Ont., which it is proposed to extend so as to have a new line to Parry Sound in opposition to the proposed road of the Canada Atlantic now being built.

Chesapeake & Ohio.—Surveys are completed for a new road up Loup Creek, which joins the Southside branch at a point on the opposite side of New River from the main line of the road at Thurmond Station, W. Va. The length of line contemplated is 10 miles. The contracts are let and the work is to be finished in 90 days. This road is built for the purpose of developing the coal properties west and south of New River, and extensive preparations are being made to open a large number of mines by the time the road is completed.

The contracts for this branch have been awarded to the following firms: Wright & Co., Montague & Tyler, and Eggleston & Dennis, of Richmond, Va.; J. C. Carpenter, Clifton Forge, Va.; G. G. Gooch, Staunton, Va., and W. A. Rinehart, Covington, Va. There are about 300 hundred men on the work at present. This number will be very materially increased in the near future.

Chicago, Rock Island & Pacific.—The officers state that the new Lincoln cut-off will not be in operation much before Jan. 1, so that through trains over the new route must be postponed until after that date, instead of being run in November, as reported in the newspapers. The new line is being built from Lincoln to Jansen, Neb., 51 miles, and about 25 miles of grading has been completed, but the tracklaying has not yet been commenced. The contractors are J. A. Ware & Sons, McCormick Bros., and Templeton & Morrell.

Coburg, Northumberland & Pacific.—This company is calling for bids, to be received up to Nov. 15, for the construction of the road from Coburg, Ont., to the Central Ontario Junction of the Canadian Pacific, a distance of about 48 miles. A preliminary survey of the line has been made by H. K. Wickstead, C. E. This road has been subsidized to the extent of over \$5,200 per mile, and the company is authorized to issue bonds to the extent of \$15,000 per mile. Alexander Poe, Coburg, Ont., is Secretary.

Egypt (N. C.).—Work was begun last week with a considerable force on an extension from Egypt in Chatham County westerly to Randolph in Randolph County. The ties and rails for the extension have already been delivered.

Fair Hill.—Mayor Stuart, of Philadelphia, has vetoed the ordinance for the construction of this road, passed by the City Council in September. The new line is a freight branch of the Pennsylvania, about one mile long, in the Thirty-third Ward of Philadelphia, and will cross seven streets at grade. Mayor Stuart objects to the establishment of these crossings unless some provision is made for abolishing them when the development of that part of the city makes them dangerous.

Florence, Cripple Creek & State Line.—The grading begun some weeks ago in Florence, Col., is still in progress, but the number of men employed is so small that little work has been done. The surveyors are now working north of the Arkansas River. The officers again assert that bids will soon be asked for the heavy work in the Great Ute cañon.

Galveston & Beaumont.—Michael E. Lynch, of Fort Worth, Tex., has been engaged for several weeks in the surveys of this proposed Texas road. The western terminus of this line is to be at Bolivar Point, opposite Galveston, and the route is through Beaumont, Tex., continuing in a northeasterly direction to Alexandria, La., a total distance of about 230 miles, 120 of which will be in Texas and 100 in Louisiana. Nothing further than a reconnaissance of the route, which has just been completed, has yet been done. The gradients and curvature will be light; the main traffic will be rice, fruit and vegetables, together with long leaf pine lumber for export through the port of Galveston.

Great Northern.—Principal Assistant Engineer John F. Stevens says that about 20 days' work will finish the grading and bridging on the Pacific Coast extension on the west side of the mountains, and on the east side is well ahead of the tracklayers. Nearly 2,000 men are employed on the west and 1,500 on the east side. "About 50 men a day leave, for I never saw such a restless class of labor as there is on the coast, but we are sending up 300 men a week, just about enough to keep the ranks full. Tracklaying has been resumed on the west side, and on the east it should be finished from Wenatchee to the summit in 30 days, so that we should get it connected at the summit by Dec. 1 at the latest. Work on the switchback is going on rapidly. The bed is cut right into the mountain, and there is very little cribbing, though there is about a mile of bridging in the seven miles. Snow is not likely to delay the completion of the line, for my observation is that the heavy snowfall in the mountains does not come till January."

Kansas City, Nevada & Ft. Smith.—General Manager Gentry states that the construction of the first section of the southern extension is now practically completed, and he expects to have trains running from Hume south to Clayton, Mo., where connection will be made with the Missouri, Kansas & Texas about the middle of

November. He hopes to have the road completed to Pittsburgh, Kan., about 50 miles, early in January next.

Laurel River & Hot Springs.—The route of this road is described as from Hot Springs on the Western North Carolina up Tanyard Branch, through Gahagan Gap, down Hurricane Creek to Laurel River, up Laurel River to the mouth of Foster Creek, 24 miles in length. Preliminary surveys are made, the location established for eight miles and side stakes set for four miles. Two miles has been graded and 25 men are now at work. The maximum grade, with load, is 158 ft. a mile; against load, 298 ft. One bridge 300 ft. long and 10 trestles will be constructed and about 20 small trestles. The principal part of the stock is held in Lynn, Mass. H. M. Ramsour is Chief Engineer.

Midland Terminal.—This company is working a large force of men on the grade for the narrow gauge from the town of Midland to Cripple Creek, Col. Seven miles of the roadbed is ready for the rails and the contractors are confident of being able to have the entire road completed by Christmas. The road is the Cripple Creek branch of the Colorado Midland.

New Roads.—H. F. De Bardeleben and associates, of Birmingham, Ala., have arranged for the construction of a new road about 10 miles long from Siluria in Shelby County, Ala., south of Birmingham, to reach a new saw-mill formerly located at Verbena. The output of this mill will be the principal traffic of the road.

North Galveston, Houston & Kansas City.—Tracklaying was recently begun on the nine miles of road graded between North Galveston and Virginia Point, Tex. The rails have been delivered for this section, and before the last ten miles has been graded the balance of the rails will be on hand. The construction work is in charge of J. P. Nelson. J. H. Barrett, of Houston, is the contractor. It is thought that the road will be extended to La Porte or to a connection with the La Porte, Houston & Northern.

Ohio Southern.—The stockholders voted to authorize the building of the proposed extension from Springfield to Lima, O., about 60 miles, at the special meeting in Springfield, O., Oct. 20.

Oxford & Coast Line.—An officer writes that our statement on page 705, that the subsidy voted by the town of Oxford, N. C., to aid in building this road, would probably not be collected without considerable litigation, is misleading. He states that the town of Oxford subscribed \$40,000 to the company, and after the contract was made for the construction of that portion between the town and the Durham & Northern, opposition to the issue developed in the Board of Commissioners, which declined to issue the bonds. The railroad brought suit in the Supreme Court to compel the Board to issue the bonds, and at the July term judgment was entered that the town should issue \$20,000 instead of \$40,000; that the company should waive all claims to more than \$20,000, and that the town should relinquish its claim to any stock in the road. This compromise was satisfactory to the railroad, the Board of Commissioners and the citizens of the community. The bonds, \$20,000, were issued and have been placed, and the money expended in right of way, grading and trestling. The company is arranging for cross-ties and rails, and the road will probably be completed by Christmas.

Paducah, Tennessee & Alabama.—Trains began running on Oct. 23 over the extension from Hollow Rock south to Lexington, Tenn., 30 miles, where connection is made with the Tennessee Midland. The citizens of Davidson County will vote Nov. 8 on a by-law to subscribe \$350,000 to the stock of the Tennessee Midland, which is now controlled by this company, to secure the extension of the former road from the Tennessee River to Nashville, Tenn.

Pennsylvania.—Ties are now being cut to be used on the extension of the South Park branch from Dunlo, Pa., south to Scalp Level, in Cambria County, and work will be pushed from now on in order to have the new line ready for handling the output of the Scalp Level coal mines in the spring. These mines can be operated without sinking shafts as the veins are apart near the surface. There are five veins with an aggregate thickness of 26 ft. Philadelphia parties are behind this scheme for developing the mines and marketing the product.

Portland & Rumford Falls.—The time for receiving bids has been extended so that the contract for the extension from Portland will not be let for some days. The new line is to extend from Portland via Portland Spring, to a connection with the Maine Central within the city of Auburn, Me., about three miles from the present Maine Central Station, making the proposed extension 11½ miles long. Frederic Danforth, of Portland, is Chief Engineer.

Quaker City Elevated.—The construction of this road will be much delayed by a decision of the Highway Supervisors of Philadelphia, to not grant permits for the foundation work on the elevated structure on Market street until the right of way and injunction proceedings are settled by the courts. A number of property owners on Market street have brought suits against the company to prevent the erection of the elevated road, but it is said that the opposition comes chiefly from the Traction Co., which owns the cable on Market street. President Buchholz said that the company may bring suit to compel the Supervisors to grant it authority to open Market street, from Front street, west.

Wabash.—President Ashley and General Manager Hays are making an inspection trip over the new Detroit-Chicago line. The track has been laid for 84 miles on the main line, perhaps 15 miles since our report two weeks ago. This leaves 70 miles of track to complete the new road. About 20 miles of sidings have been laid and there will be as much more when the road is opened. The first train will probably be run over the new line in December. Large sums are being spent at Ashley, Ind., a new town, which will be a division terminal.

Wilkes Barre & Eastern.—This line, as already described, begins at Wilkes Barre, Luzerne County, Pa., and ends at Stroudsburg, Monroe County, Pa., making connection at the latter point with the New York, Susquehanna & Western. The whole road is now under contract and it is expected that the grading will be completed and a considerable portion of the track laid by Jan. 1 next. The road is located as near as possible on a straight line between the termini above named. The country through which it passes is partly rough and mountainous and partly a smooth and well cleared farming country. Every part of the grading and masonry is now under contract and rapidly being pushed to completion. W. P. Ryman, of Wilkes Barre, is President of the company. Details of the bridge work are given in another column.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The comparative statement of operations for September and the three months of the fiscal year is as follows:

Month of September:	1892.	1891.	Inc.
Average operated mileage...	7,130	7,124	6
Gross earnings.....	\$3,666,491	\$3,429,359	\$237,132
Operating expenses.....	2,236,044	2,130,732	105,272
Net earnings.....	\$1,430,447	\$1,298,627	\$131,820
Other net receipts (estimated).....	75,000	75,000	
Total net earnings.....	\$1,505,447	\$1,373,627	\$131,820
One-twelfth annual fixed charges (estimated).....	850,000	850,000	
Surplus.....	\$655,447	\$523,627	\$131,820
Three Months to Sept. 30, 1892.			
Average operated mileage...	7,130	7,119	11
Gross earnings.....	\$10,163,576	\$9,509,290	\$654,277
Operating expenses.....	6,636,775	6,357,888	278,887
Net earnings.....	\$3,526,801	\$3,151,402	\$375,399
Other net receipts.....	225,000	225,000	
Total net earnings.....	\$3,751,801	\$3,376,402	\$375,399
Three-twelfths annual fixed charges (estimated).....	2,500,000	2,500,000	
Surplus.....	\$1,251,801	\$876,402	\$375,399
Aggregated General System:			
Average operated mileage...	9,344	9,338	6
Gross earnings.....	\$1,807,775	\$1,414,963	\$392,782
Operating expenses.....	2,887,472	2,727,472	160,000
Net earnings.....	\$1,920,131	\$1,717,521	\$202,610
Other net receipts.....	75,000	75,000	
Total net earnings.....	\$1,995,131	\$1,792,521	\$202,610
One-twelfth annual fixed charges (estimated).....	1,104,000	1,102,000	2,000
Surplus.....	\$891,131	\$690,521	\$200,610
Three Months to Sept. 30, 1892.			
Average operated mileage...	9,344	9,332	12
Gross earnings.....	\$13,349,800	\$12,328,317	\$1,021,483
Operating expenses.....	8,518,062	8,138,549	379,513
Net earnings.....	\$4,831,738	\$4,189,768	\$641,970
Other net receipts.....	225,000	225,000	
Total net earnings.....	\$5,056,738	\$4,414,768	\$641,970
Three-twelfths annual fixed charges (estimated).....	3,582,000	3,576,000	6,000
Surplus.....	\$1,474,738	\$838,768	\$635,970

The contract with the Torrence Elevated Terminal Co., by which the latter company acquires all the Chicago property of this company was ratified by the directors Oct. 29.

Central Vermont.—At a meeting of the stockholders of the company, held last week, the vote of the directors approving of the mortgage for \$15,000,000 was ratified and confirmed by a unanimous vote, over 9,000 shares being represented.

Chattanooga Southern.—In the United States Circuit Court at Chattanooga, Judge Key has ratified an order of the Georgia Circuit of the United States Court in foreclosing the mortgage of the Central Trust Co. against the road. The foreclosure is in default of the payment of \$43,000 interest on \$1,440,000 of bonds. The road runs from Chattanooga to Gadsden, Ala., 92 miles.

Chicago, Burlington & Quincy.—The financial statement for September shows the following results:

	1892.	1891.	Inc.
Gross earn.....	\$4,135,508	\$3,713,135	\$422,373
Oper. expen.....	2,413,451	2,068,292	345,159
Net earn.....	\$1,722,057	\$1,644,843	\$77,214
Fixed charges.....	810,000	795,186	14,814
Surplus.....	\$912,057	\$849,657	\$62,400
Nine months:			
Gross earn.....	\$29,306,770	\$24,406,057	\$4,900,713
Oper. expen.....	19,452,544	15,296,600	4,155,944
Net earn.....	\$9,854,226	\$9,109,457	\$744,769
Fixed charges.....	7,230,000	7,156,675	73,325
Surplus.....	\$2,624,226	\$1,952,782	\$671,444

Chicago, Milwaukee & St. Paul.—The earnings of the company for September were:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$3,109,376	\$3,063,600	I. \$45,776
Oper. expen. and taxes.....	1,604,448	1,763,734	I. 159,286
Net earn.....	\$1,504,928	\$1,299,866	I. \$205,062
Three months from July 1:			
Gross earn.....	\$8,586,384	\$7,770,167	I. \$816,217
Oper. expen.....	5,779,215	5,060,084	I. 719,131
Net earn.....	\$2,807,169	\$2,710,083	I. \$97,086

Chicago & Northwestern.—This company suffered seriously in the great fire at Milwaukee on Oct. 29. It seems to have been practically the only railroad that was much affected, the property of the Chicago, Milwaukee & St. Paul being in a part of the city which was not touched by the fire. An officer of the company states that the number of freight cars burned up was 198. Many of these were loaded with merchandise. A large freight house was burned up, and the estimate of the loss the day after the fire, including this building and its contents and the cars, was \$300,000. Probably this is much too large. The walls of the freight house were left standing, and it was partly roofed over and made fit for business on the next day. The freight house of the Milwaukee, Lake Shore & Western, which road is controlled by the Chicago & Northwestern, was also burned.

Davenport, Iowa & Dakota.—This road was sold at auction at Davenport, Ia., Nov. 1, to the Burlington, Cedar Rapids & Northern for \$320,000, to satisfy a judgment for that amount held by the Farmers' Loan & Trust Co.

Duluth, Red Wing & Southern.—There is no truth in the newspaper report that this property has been sold or passed into the control of the Canadian Pacific.

Fitchburg.—A certificate of the consolidation of the Fitchburg of Massachusetts, Boston, Hoosac Tunnel & Western, and the Troy, Saratoga & Northern, under the name of the Fitchburg Railroad Co., was filed at Albany, N. Y., this week.

Morristown & Cumberland Gap.—James T. Shields, of Knoxville, Tenn., has been appointed temporary Receiver. The application was made on the application of

bondholders. The appointment of a permanent Receiver will be argued on Nov. 10. The road is operated between Morristown and Corrytown, 40 miles in Eastern Tennessee.

New York, New Haven & Hartford.—The contract of the Wagner Car Co. for managing the sleeping and parlor cars on the Shore Line between New York and Boston expired Nov. 1 and was not renewed. Under this contract the ownership of the cars was largely held by the railroad company, and the present equipment will all be retained. The new cars for the two o'clock limited trains which were announced several months ago, were put on Nov. 1. The signals and apparatus for operating the block system between New Haven and New London are now being put in, and it is expected to put the system in operation about Dec. 1. The company is building a new roundhouse at Willimantic, and making an extensive addition to the yard at that place.

Lehigh Valley.—The result of the operation of the road by the lessee for the month of August, 1892, is as follows:

	1892.	1891.	Inc. or dec.
Gross earnings.....	\$1,548,760	\$1,528,441	I. \$20,319
Oper. expenses.....	1,100,140	1,120,966	D. 20,826
Net earnings.....	448,620	407,475	I. 41,145
Nine months ending Aug. 31:			
Gross earnings.....	\$13,325,702	\$12,177,241	I. \$1,148,461
Oper. expenses.....	10,065,492	9,776,509	I. 288,983
Net earnings.....	3,260,210	2,400,731	I. 859,479

Pennsylvania.—The statement of eastern lines for September make the following comparisons:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$4,098,024	\$3,159,567	D. \$938,457
Oper. expen.....	4,045,029	3,913,181	I. 131,848
Net earn.....	\$2,052,995	\$2,246,376	D. \$193,381

Western lines for September show a gross increase of \$108,562, an increase in expenses of \$163,657, and a net decrease of \$55,095, making for the system a net decrease of \$248,470.

Nine months to Sept. 30:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$39,598,751	\$39,327,121	I. \$271,630
Oper. expen.....	36,070,161	34,046,069	I. 2,024,092
Net earn.....	\$14,528,590	\$15,281,052	D. \$752,462

Western lines for nine months show a gross increase of \$2,570,613, and a net decrease of \$201,256, making a net decrease for the system of \$1,154,718.

Philadelphia & Reading.—The report of earnings and expenses for September and the fiscal year gives the following figures:

Month of September:	1892.	1891.	Inc. or dec.
Gross earnings.....	\$2,184,922	\$2,124,961	I. \$59,961
Oper. expenses.....	1,073,410	1,049,073	I. 24,337
Profit in operating.....	1,091,482	1,075,888	I. 15,594
(Other sources, receipts.....	30,850	24,590	I. 6,260
Net earnings.....	1,122,332	1,100,478	I. 21,854
One-twelfth of current year's fixed charges.....	825,000	611,769	I. 213,231
Perm. improv. and interest.....	634,618	676,596	D. 41,978
Surplus.....	477,714	423,888	I. 53,826
Fiscal year:			
Gross earnings.....	\$18,734,872	\$17,656,596	I. \$1,078,276
Oper. expenses.....	10,207,630	9,618,292	I. 589,338
Profit in operating.....	8,527,242	8,038,304	I. 488,938
Other receipts.....	476,798	532,373	I. 55,575
Net earnings.....	9,004,040	8,570,677	I. 433,363
Perm. improv. and interest.....	6,379,137	6,592,282	D. 213,145
Surplus.....	2,624,903	1,978,395	I. 646,508

Texas Central.—The committee appointed by the bondholders some time ago made a report last week. The report states that about \$350,000 has been expended for betterments. The Farmers' Loan & Trust Co. advanced \$250,000 at six per cent. and the rest was raised on demand loans. The committee was authorized to proceed with the reorganization of the road as proposed. The plan is to issue stock and income bonds to the amount of the present first mortgage bonds, \$3,349,000. The committee also recommends the building of branch lines costing \$1,300,000 to be bonded to the like amount, and that \$150,000 be expended for new rails.

Toledo, St. Louis & Kansas City.—A number of the New England preferred stockholders held a meeting at Boston, Nov. 1, and resolutions were passed protesting against the placing of a \$13,500,000 mortgage on the property and against the calling for Nov. 14 of a meeting of the preferred stockholders at the same hour as a meeting of the common stockholders.

Wabash.—The financial statement for September is as follows:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$1,406,142	\$1,356,142	I. \$50,000
Oper. expen.....	1,000,530	992,331	I. 8,199
Net earn.....	\$405,612	\$363,811	I. \$41,801
July 1 to Sept. 30:			
Gross earn.....	\$3,936,870	\$4,361,402	D. \$424,532
Oper. expen.....	2,849,534	2,856,616	D. 7,082
Net earn.....	\$1,087,336	\$1,504,786	D. \$417,450

TRAFFIC.

Traffic Notes.

The Cincinnati, New Orleans & Texas Pacific has put on a new fast passenger train between Cincinnati and New Orleans.

The New York, Chicago & St. Louis now runs a through passenger train six days in the week between Buffalo and Chicago. These trains commenced running on Oct. 10, and carry through Wagner buffet sleeping cars.

The Duluth & Iron Range reduced its passenger rate from 4 cents to 3½ cents a mile on Nov. 1. By special enactment, this line was allowed to charge 4 cents, while all other roads in the State were restricted to 3 cents in their passenger tariffs.

The breaking up of a big circus is always a bonanza for the passenger men. A dozen or two travelling passenger agents went to Paducah, Ky., last week, to be on hand when the Barnum & Bailey circus disbanded. The Newport News & Mississippi Valley secured 342 passengers for eastern points out of a total of 700.

The Philadelphia & Reading, which has lately worked its coal mines a little more than for several months past, was obliged last week to again restrict the output, largely in consequence of the blockade of the road. The tide-water terminals were crowded and cars had to be stored on the main tracks. It appears that coincidentally with this blockade there is difficulty at some of the mines from lack of water.

A Kansas City firm has sent a shipload of corn to Vera Cruz, Mex., via Galveston. It is said that the rate through is about 72½ cents per 100 lbs., as compared with 85 cents by all rail routes. These figures, however, do not indicate the rates by the respective routes to the City of Mexico. To that city the Vera Cruz route is probably at a disadvantage. It will be remembered that the reason for shipping corn this way was the blockade on the all rail lines.

The Atchison, Topeka & Santa Fe will on Nov. 6 put on a new limited train, composed of vestibuled sleeping and parlor cars between Chicago and California points, scheduled to leave here every day at 10 A. M. and reach Los Angeles on the morning of the fourth day at 7:30, which is 7¼ hours quicker than the fastest time now made. Coming east the train will leave Los Angeles at 5:30 P. M. and reach Chicago at 8:30 P. M. of the fourth day. There will be a through dining car on this train.

The New England Traffic Managers met in Boston last week and agreed to restore westbound freight rates (to the northwest) on Nov. 20, the close of navigation. The rates to St. Paul, Minneapolis and Duluth will then be as follows:

First class, \$1.20; second, \$1.11; third, 87 cents; fourth, 58 cents; fifth, 49 cents; sixth, 42 cents.

On the Soo line and the National Dispatch the new rates will be:

	1	2	3	4	5	6
	1.20	1.09	.81	.54	.45	.29

The discontinuance of free delivery of freight at Atlanta, Ga., which went into effect this week, has caused a good deal of excitement among the merchants. If we may judge by the Atlanta newspapers. It appears that the agreement among the roads provides for the cessation of free delivery only on goods coming from the West. On freight from eastern points it will not be discontinued until Jan. 1. It is said that the East Tennessee, Virginia & Georgia and the Western & Atlantic have agreed upon a plan of reciprocity for delivering cars of bulk freight to private sidings on their respective lines within the city.

Chicago Traffic Matters.

CHICAGO, Nov. 2.

It is probable that the roads will begin this month to make arrangements for handling the business of the Exposition. The subject is docketed in the Western Passenger Association for the November meeting, but probably nothing more will be done than to refer the subject to a committee, as it is understood that a "mass meeting" of all the lines will be held in this city some time this month. The roads are now inclined to endeavor to make very moderate reductions, as they believe that their equipment will be taxed to its utmost; but it is to be feared that in the scramble for business which is pretty sure to ensue next year that some of the weak lines will break down faster to some absurd figure.

There is little probability that the Trans-Continental Association will be reorganized, unless the Great Northern changes its present attitude in respect to trans-continental business. Chairman Vining has called a meeting of the lines in the association for Nov. 15 to take action upon the withdrawals already filed.

The competitors of the Chicago & Northwestern and the Wisconsin Central are inclined to raise a row because they say the Northwestern and Wisconsin Central are selling local tickets between Chicago and St. Paul in through tourist sleepers in violation of the agreement among the lines not to use these cars for local business between Chicago and St. Paul or Omaha.

The arbitrators in the Santa Fe Denver rate cases spent three days last week taking testimony and considering the cases. They have taken the matter under advisement and will not render a decision until they have further considered it.

A report was current here last week that a large quantity of counterfeit tickets of Union Pacific issue were on the market. General Passenger Agent Lomax denies the truth of the rumor, and says that they have had no such trouble with the "Lomax ticket."

Chairman Midgley has issued a circular stating that authority was given April 20, 1892, to accept from Mississippi River to Southwestern Missouri River points a proportional rate of 12½ cents per 100 lbs. on imported tinplate, carloads, when coming from Baltimore, Newport News, or Montreal. The proportional rate was not, however, to extend north of St. Joseph. Application has now been made for the extension of the rate to Omaha, South Omaha, and Council Bluffs, and authority is therefore given to put into effect the proportional rate of 12½ cents on imported tinplate, carloads, when coming from Baltimore, Newport News, Montreal, or Portland, Me.

A rule of the Western Freight Association that cotton piece goods must be marked in a certain way to secure third-class rates has caused so much friction that it is now repealed. The main objection came from Sioux City whose merchants threatened to replevin their goods unless they were charged at third-class rates instead of first-class. It appears that the shipments which were the subject of complaint were billed from Eastern points at third-class, but were examined by the inspectors at Chicago and the billing changed.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Oct. 29 amounted to 81,046 tons, against 61,616 tons during the preceding week, an increase of 19,430 tons, and against 50,701 tons during the corresponding week of 1891. The proportions carried by each road were:

Roads.	W'tk to Oct. 29.		W'tk to Oct. 22.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	14,928	18.4	10,387	17.2
Wabash.....	4,021	5.0	4,395	7.0
Lake Shore & Michigan South.....	13,541	16.7	11,757	19.1
Pitts., Ft. Wayne & Chicago.....	8,674	10.7	6,373	10.4
Pitts., Cin., Chicago & St. Louis.....	10,978	13.5	6,615	10.8
Baltimore & Ohio.....	3,222	4.1	3,257	5.0
Chicago & Grand Trunk.....	5,890	7.0	5,327	8.3
New York, Chic. & St. Louis.....	6,915	7.4	4,730	7.7
Chicago & Erie.....	10,750	13.3	7,783	12.7
C., C., C. & St. Louis.....	3,148	3.9	2,973	4.8
Total.....	81,046	100.0	61,616	100.0

Of the above shipments, 3,310 tons were flour, 37,158 tons grain and millstuff, 10,117 tons cured meats, 14,682 tons dressed beef, 1,219 tons butter, 2,750 tons hides and 8,743 tons lumber. The three Vanderbilt lines carried 42.5 per cent., the two Pennsylvania lines 24.2 per cent. The lake lines carried 31,947 tons, against 105,651 tons during the preceding week, a decrease of 73,704 tons.

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The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand tot
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,606	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

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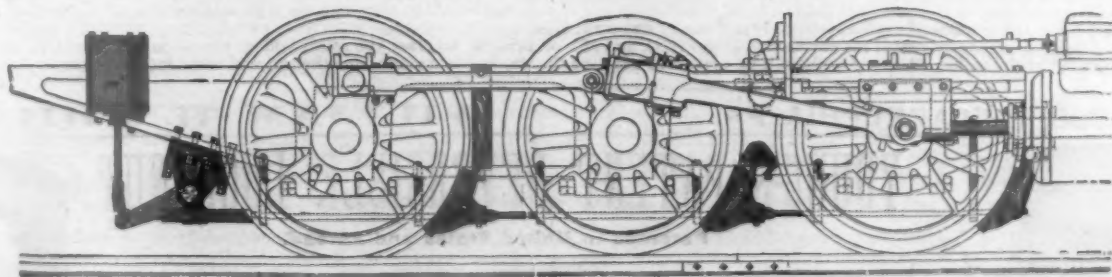
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Yours very truly,
UNION ROLLING MILL CO.,
WILLARD FULLER, Supt.

We Also Manufacture a Full Line of STEEL WHEELBARROWS for All Purposes.

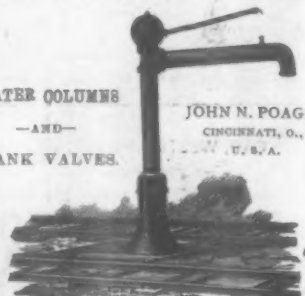
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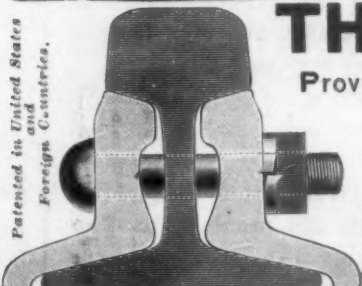
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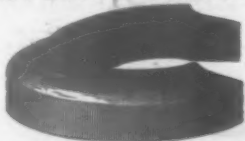
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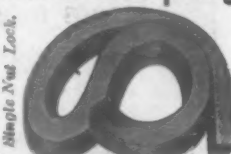
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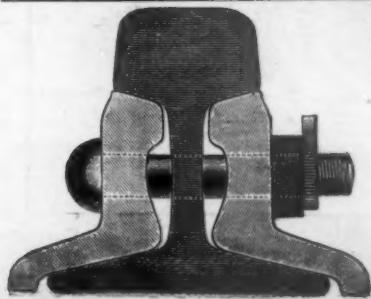
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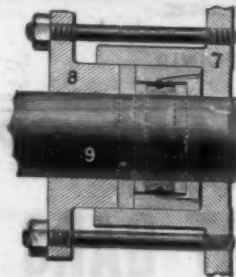
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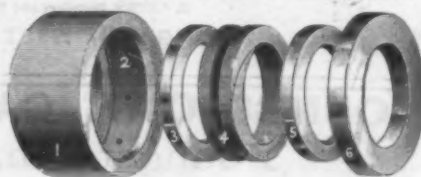
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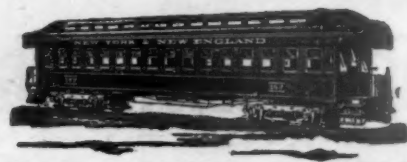
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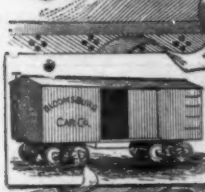
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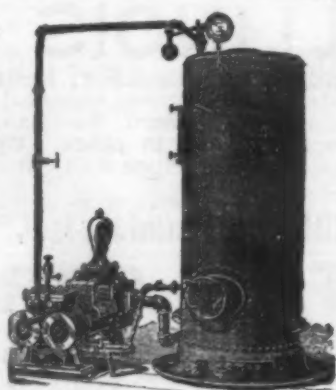
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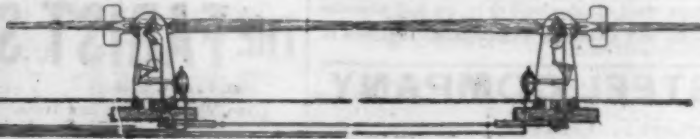
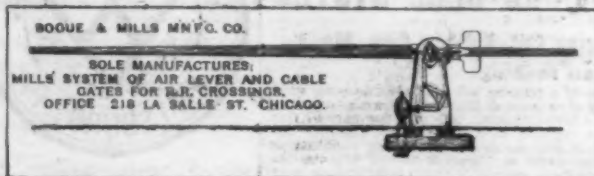
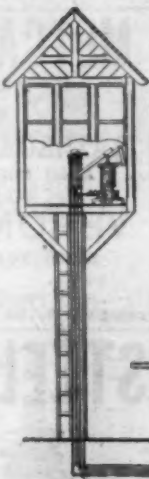
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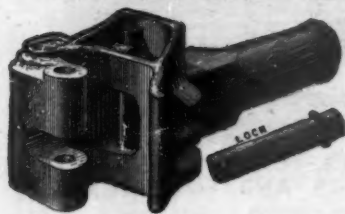
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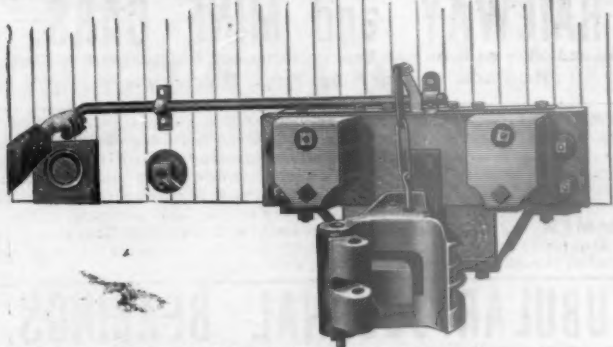


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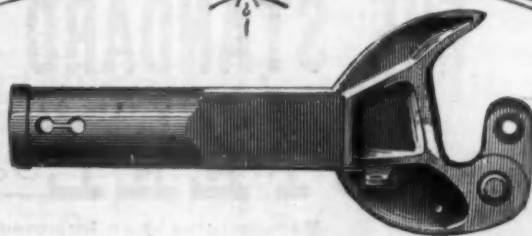
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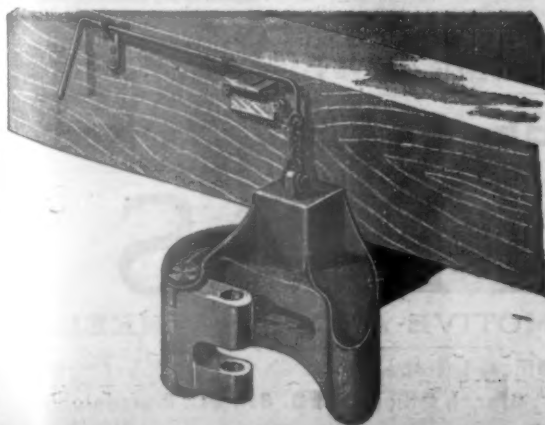
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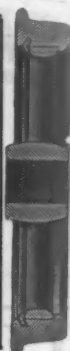
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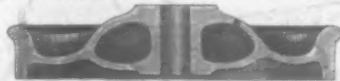
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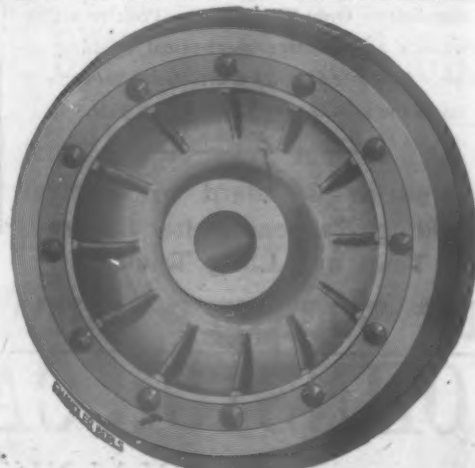
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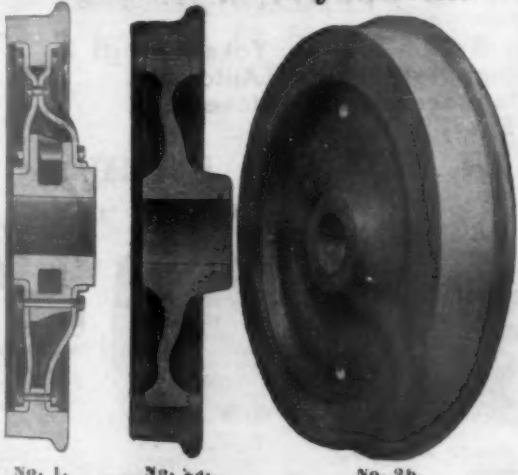
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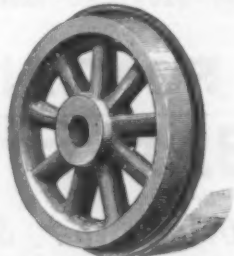
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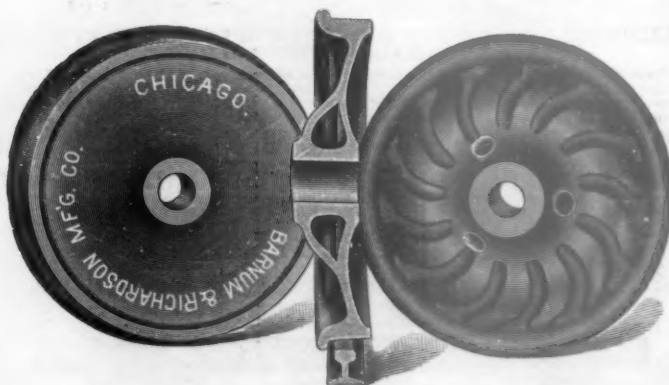
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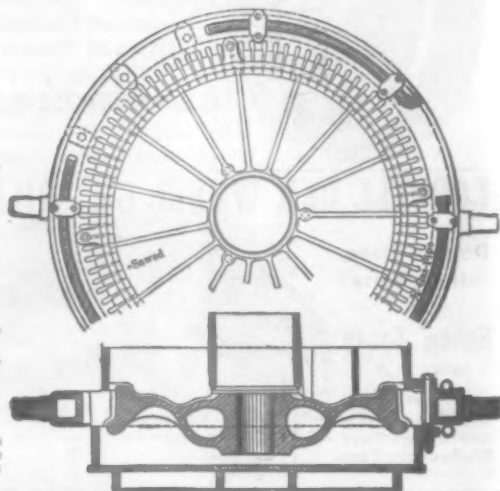
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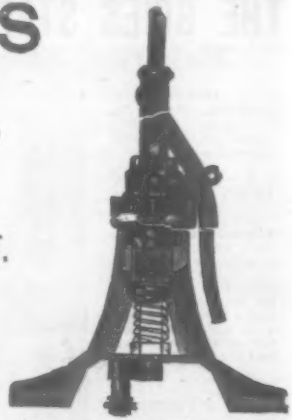
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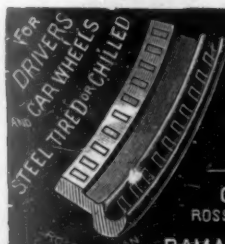
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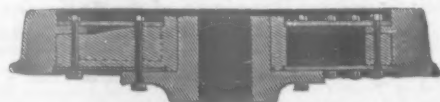
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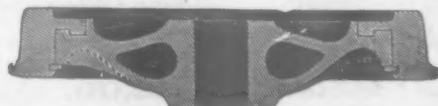


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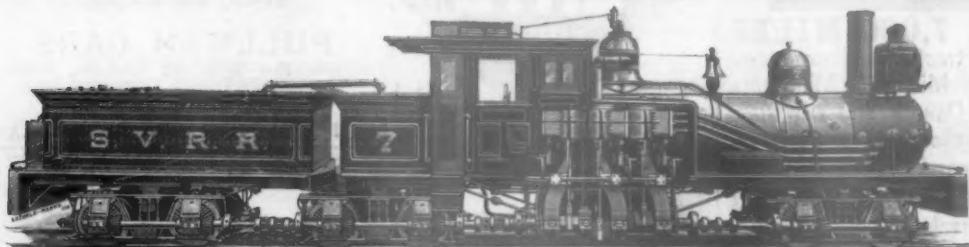


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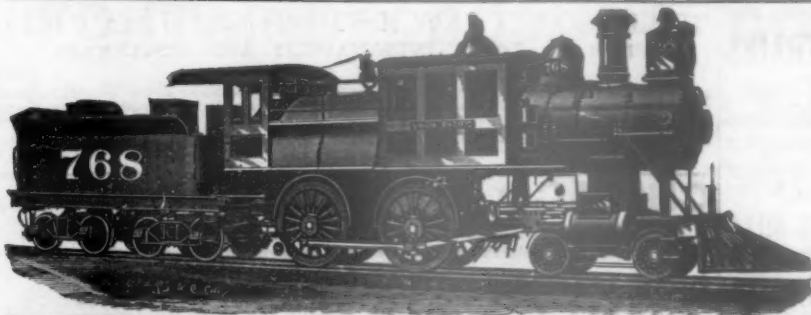


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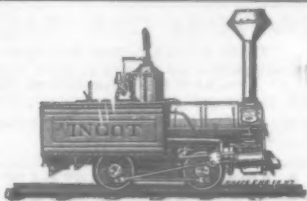
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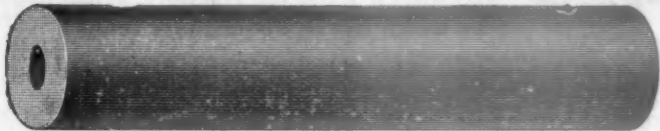
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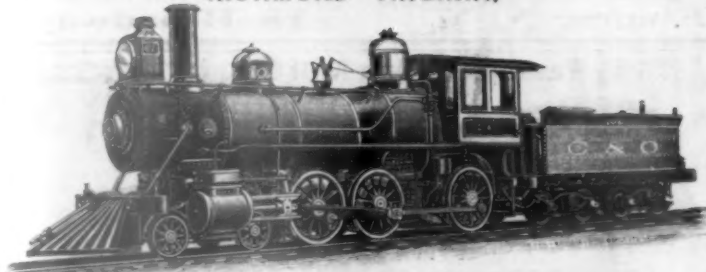
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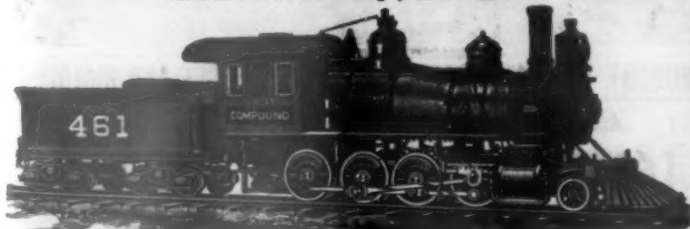
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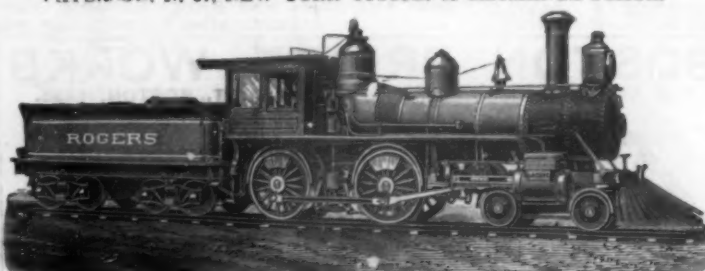
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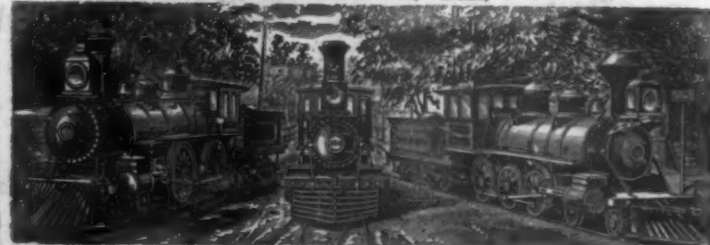
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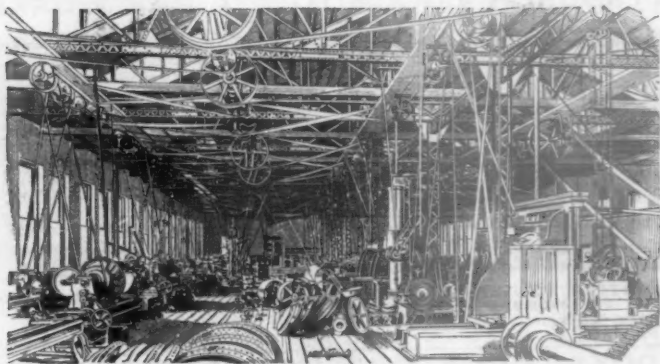
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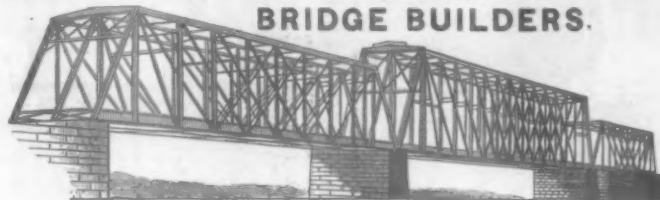
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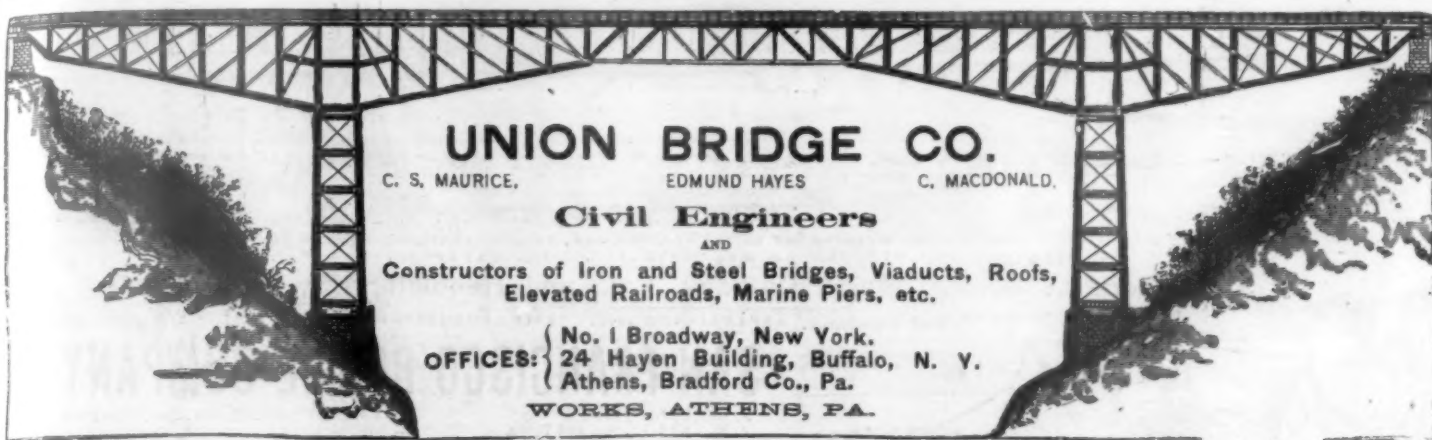
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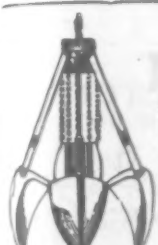
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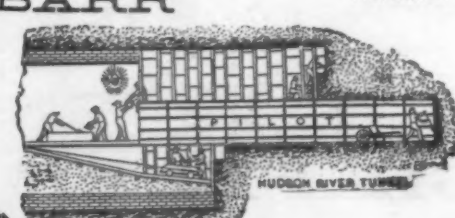
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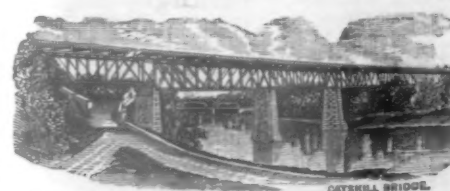
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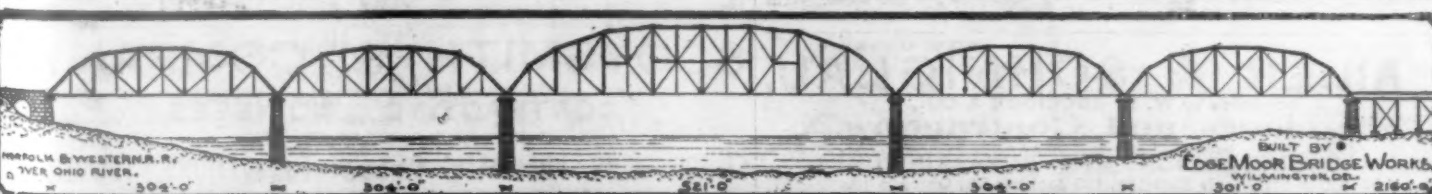
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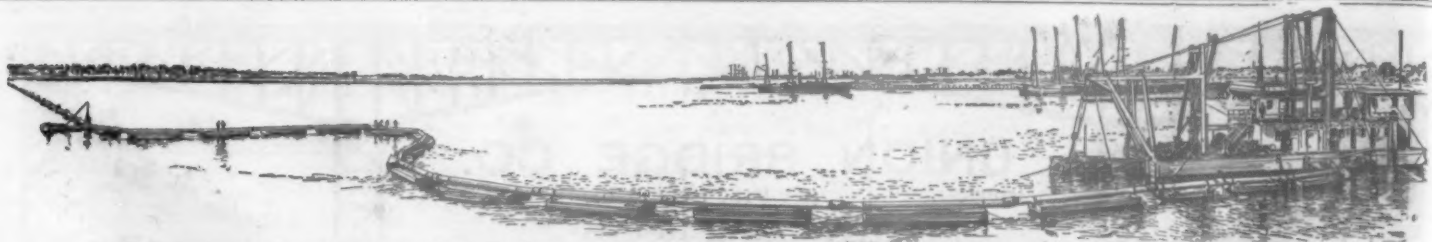


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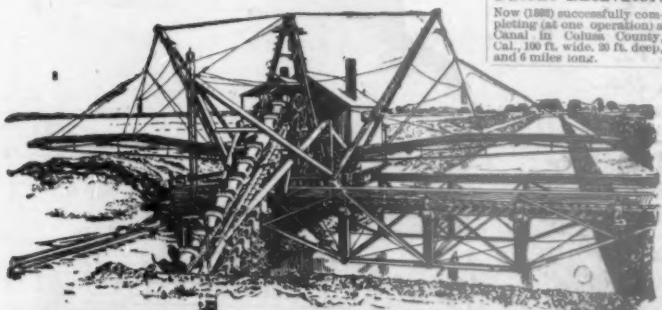
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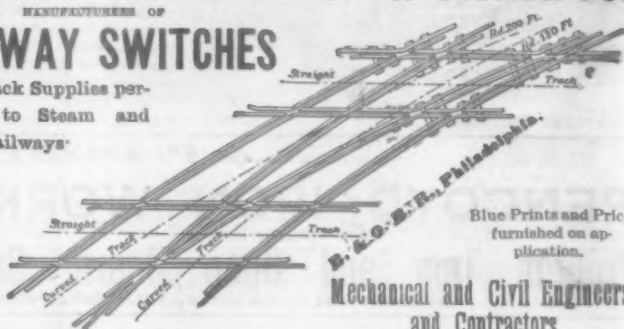
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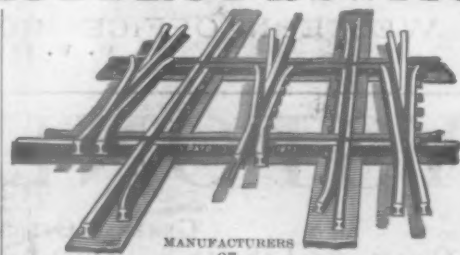
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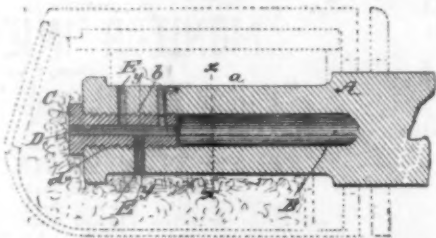
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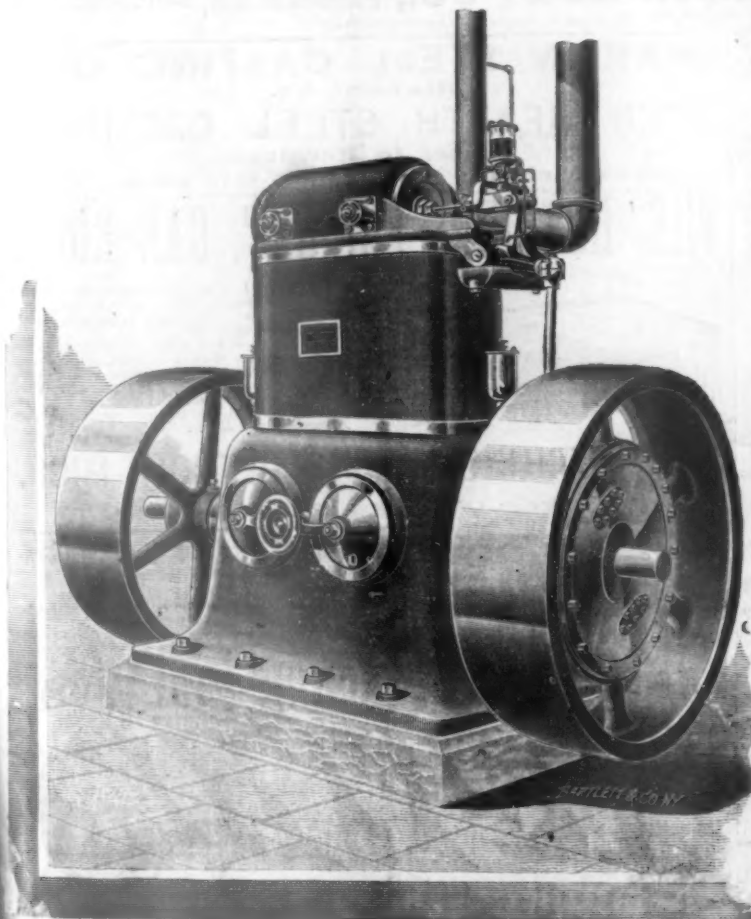
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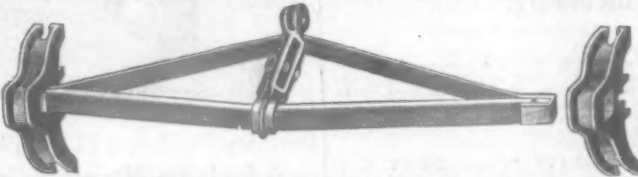
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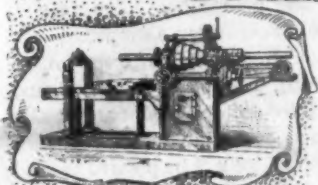
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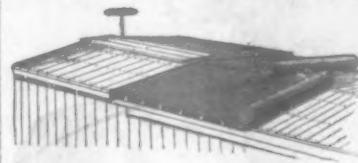
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